AMERICA'S LARGEST TEXTILE MONTHLY

COTTON

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NATIONAL U.S.A. DYES

Calling a Spade a Spade

When the National Aniline & Chemical Company Inc., announces a new dye it issues a New Dye Bulletin showing dyed swatches of the color in different percentages and on different materials, the method of application and stating the properties of the dye under various fastness tests.

The description of these fastness properties is strictly accurate and may be depended upon by the dye user.

If a dye is of "excellent" fastness, the description so states; if the fastness properties are only "moderate" or "poor" that also is frankly stated.

National Aniline and Chemical Co., Inc.

New York *Chicago* *Charlotte* *Toronto* *Philadelphia*
Boston *Hartford* *Montreal* *Providence* *San Francisco*

NATIONAL DYES

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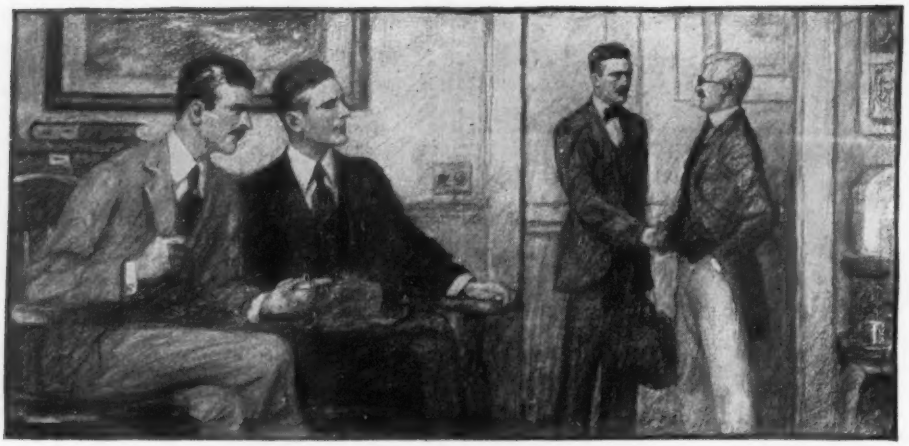


"How Does Smith Get the Business?"

Smith is sales representative for a manufacturer of colored goods. Do you know Smith? We imagine you do, although Smith is not his real name.

As a matter of fact, Smith is a composite person.

On one occasion when you see him he may be a short fat man, the next time a tall thin man. But although Smith varies in physical appearance, you can always identify him in other ways. He always looks as if he was going somewhere. He always *is* going somewhere. He seems to know what he is going to say to a buyer and to be confident of the result. And when he leaves the buyer he always seems to have an order or the assurance of one. In fact, this happens so frequently that other salesmen look at Smith as he takes leave, and say:

"How Does Smith Get The Business?"

How *does* Smith get the business? Undoubtedly, Smith's personality helps him considerably, but aside from that Smith invariably uses as a part of his selling talk, one brief sentence which always seems to make an impression and to establish a common point of interest between himself and the converter.

"*We use Franklin Dyed Yarn,*" says Smith, and immediately the converter's wall of reserve begins to crumble; he reaches for his own color card to point out to Smith the Franklin colors which he is planning to use in his new pattern.

The converter has learned from experience that the unusual brilliancy and solidity of Franklin colors greatly increase the saleability of his goods; also that their extreme penetration and fastness assure continued satisfaction on the part of the customer. That is why he likes to do business with mills that use Franklin Dyed Yarn and that is why in so many cases he specifies that nothing *but* Franklin Dyed Yarn shall be used.

Upon request we will be glad to advise you what converters specify Franklin colors.

Are your sales representatives Smiths, or are they the fellows who are wondering how the Smiths get the business?

Why not make them Smiths, by sending your next order for dyeing to us? Send the yarn to us on cones, packages or parallel tubes and we will dye it and return it to you on parallel tubes all ready for the V creel.

Our color card and prices will give you all the information you need. They will be sent to you on request.

FRANKLIN PROCESS CO.

Philadelphia PROVIDENCE Manchester, Eng.

New York Office, 72 Leonard Street

SOUTHERN FRANKLIN PROCESS CO.

Greenville, S. C.

NORTHROP

TRADE-MARK REG U S PAT OFF

LOOMS

ON COTTON GOODS

AND MOST WORSTEDS THAT CAN BE WOVEN

WITH ONE SHUTTLE

SAVE 50 TO 75 PER CENT

OF THE LABOR COST OF WEAVING

AND

PRODUCE BETTER GOODS

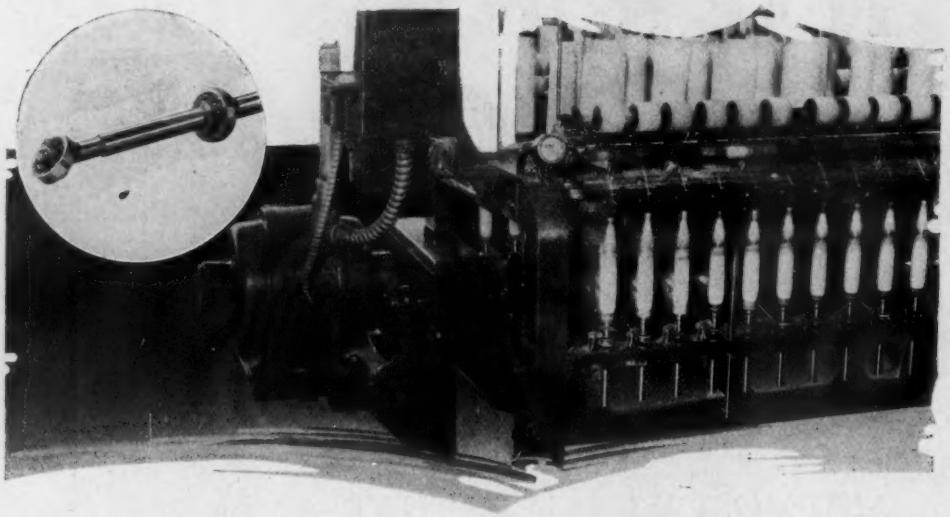
DRAPER CORPORATION

HOPEDALE MASSACHUSETTS

ATLANTA GEORGIA

Copyright 1917 by Draper Corporation

SKF



No Destructive Vibration on Spinning Frames with Ball-Bearing-Equipped Cylinders

NINETY PER CENT. of the trouble which occurs in spinning-frame cylinders finds its source in the wear of plain bearings. As the bearings wear, vibration increases and it is generally recognized that such increasing vibration shortens the life of the machine, and, besides being the cause of many breakdowns, decreases the quality and evenness of the finished work.

By using SKF marked, self-aligning ball bearings on the intermediate and end positions, wear and consequent vibration is practically eliminated. The joint in the cylinder is kept tight, the shaft does not crystallize and a more uniform spindle speed is obtained. In addition the parallelism between the motor shaft and the driven shaft is maintained, greatly prolonging the life of the driving chain.

Eliminate bearing troubles and at the same time obtain the advantages of low starting torque and absolute cleanliness by changing over to self-aligning ball bearings.

THE SKAYEF BALL BEARING COMPANY

Supervised by SKF INDUSTRIES, INC., 165 Broadway, New York City

824

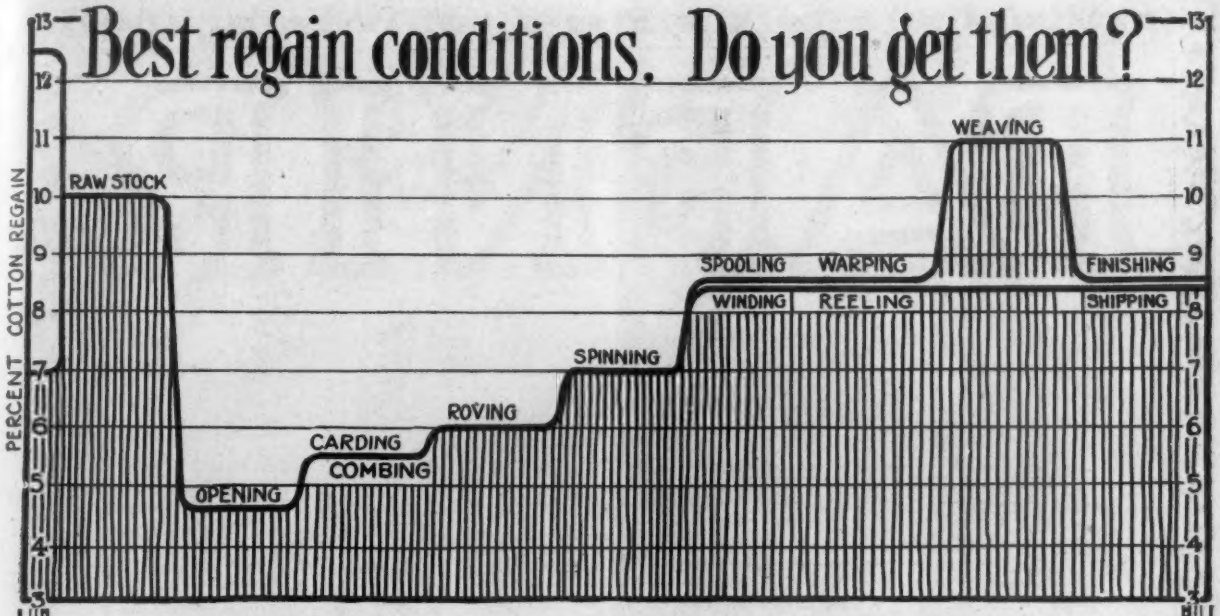
Normal View

Deflected View

BALL BEARINGS

The Highest Expression of the Bearing Principle

Best regain conditions. Do you get them?



Thirsty Cotton—The Reason—The Cost

Look at one tiny fibre of cotton through a miscroscope—and see how much it resembles a stalk of sugar cane.

Fibre of such a nature is extremely susceptible to moisture—but change it rapidly from dry to moist and back again and its elasticity is impaired, maybe destroyed.

Manufacturing cotton is really a drying process. Speed generates heat and heat dries. Everyone of those tiny little stalks when dried sends out a protest—a warning. They tend to curl and twist.

Humidifiers were installed originally to prevent this. But ParkSpray humidifiers with automatic regulation have greater possibilities.

Suppose your terminal regain is down to 4 percent—a condition we find in many humidified plants. Remember your cotton came 7 to 12 percent moist; that 8½ percent is standard; that you pay the difference. Let us figure what you lose.

With cotton at

15c you lose $3.08 on each bale
20c " " 4.12 " " "
25c " " 5.16 " " "

These losses are figured at the prime cost of raw material—not at selling price of product. They consider only raw material shrink. They do not take into account all the other manufacturing losses and perplexities that result when every little tiny stalk protests with an individual curl of its own.

There is just the right amount of moisture needed for each manufacturing operation in your mill. It may not be the same as your neighbor's. It may not be the same as in another room—on the same operation in the same plant.

There is a right way to determine what this is. Inadequate humidifier equipment is the most expensive purchase you can make at any price. We would rather install the right equipment at a fair price than hit or miss equipment at any price.

If you buy 4 percent equipment, a month or two of thirsty cotton kicks all you have saved out the shipping room door.

Parks-Cramer Company

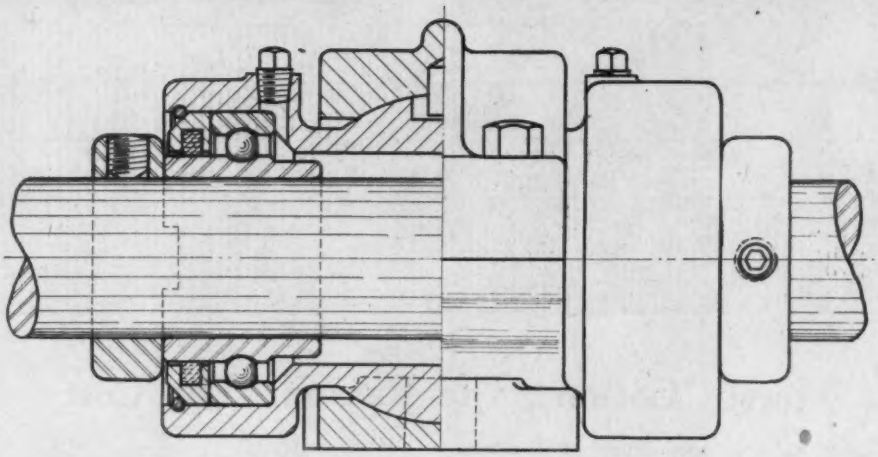
Engineers & Contractors

Industrial Piping and Air Conditioning

Fitchburg Boston Charlotte

Copyright 1922 P. C. Co.

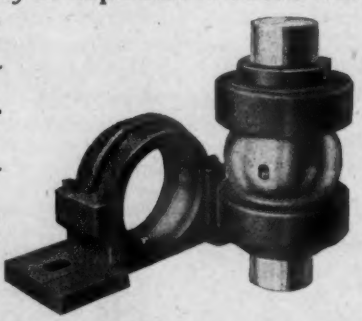
FAFNIR



The Supreme Pillow Block

The **Fafnir Double Ball Bearing Self-Aligning Pillow Block** is the simplest, most rugged and most practical pillow block ever made—it is virtually frictionless.

The two **Fafnir Transmission Ball Bearings** are installed in a rigid box involving unit construction and no adjustments. The spherical surface on the box and the seat in the pillow block provide unlimited alignment which is entirely independent of the ball bearings. This pillow block will carry the heaviest loads under any and all conditions—it is the **Supreme Pillow Block.**



Our new Industrial Bearings Catalogue, describing The *Red Dragon Line,* is just off the press.

THE FAFNIR BEARING COMPANY

Conrad Patent Licensee

New Britain, Conn.

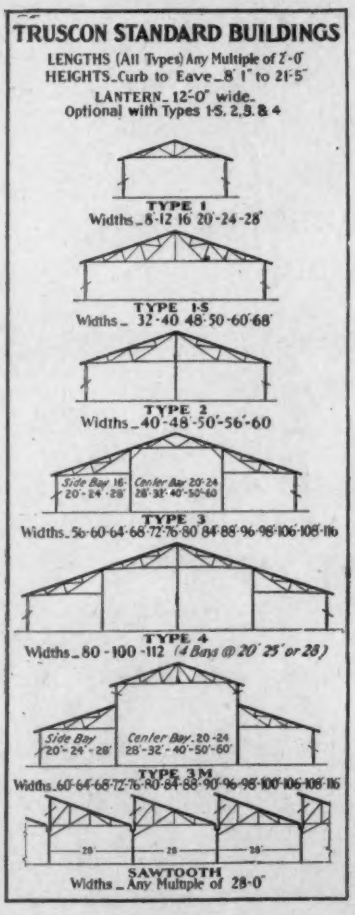
Southern Representative,

O. R. S. Pool, P. O. Box 1375, Greenville, S. C.

TRUSCON
STANDARD BUILDINGS

TRUSCON STEEL CO.

Southland Cotton Co., Memphis, Tenn. Group of various pitched roof types of Truscon Standard Buildings.



For the Cotton Industry

Built entirely of steel, including doors and windows, Truscon Standard Buildings are particularly adapted to use in the cotton industry, where fireproofness is essential. There is nothing about these buildings that can burn. Walls and roof are made of Truscon rust resisting Alloy Steel, insuring permanence.

Truscon Standard Buildings meet all needs of size and type. Built of interchangeable steel units, they can be furnished with pitched, monitor, lantern or sawtooth roof, and in any width, length or height with clear span or multiple bays. You can get any arrangement of windows or doors, making possible an individual building to suit your exact needs.

Truscon Standard Buildings can be readily enlarged or dismantled or re-erected in a new location with 100% salvage value.

For these reasons 10,000,000 sq. ft. of floor area of Truscon Standard Buildings are now in successful use for factories, warehouses, foundries, shops, cafeterias, offices, garages, service stations and many other purposes. If you are planing to build, write us for suggestions, catalog and prices.

Truscon Steel Company

Youngstown, Ohio

Warehouses and Sales Offices in Principal Cities

STAFFORD

AUTOMATIC LOOMS

For Wide Sheetings

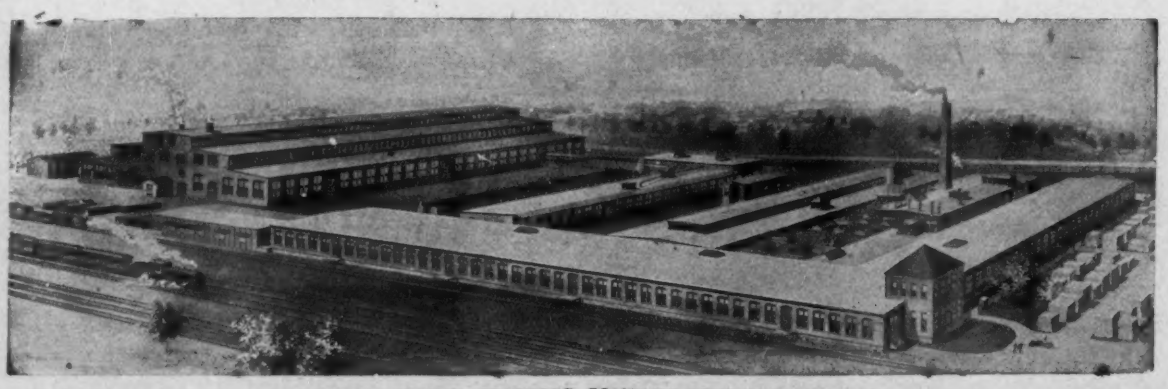
The Stafford broad loom is built to withstand severe service. Its simplicity, accessibility of parts and ease of operation are a few reasons why it is used by some of the most representative wide goods mills.

This loom embodies the high weaving qualities that characterize other Stafford looms and it can now be supplied with either shuttle or bobbin changing automatic features.

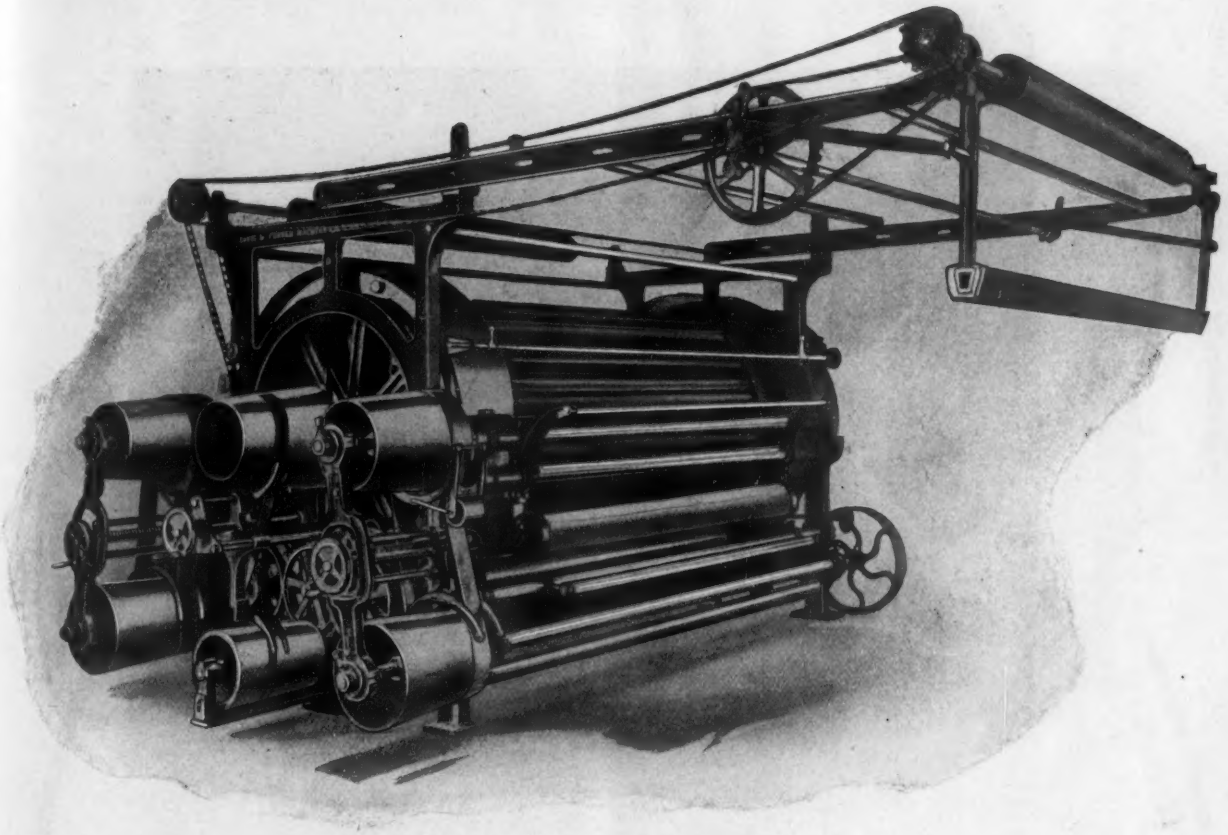
THE STAFFORD COMPANY

READVILLE, MASS.

Southern Agent, J. H. MAYES, Charlotte, N. C.



PLANT OF THE STAFFORD COMPANY, READVILLE, MASS.



36 ROLL DOUBLE ACTING NAPPER FOR COTTON G

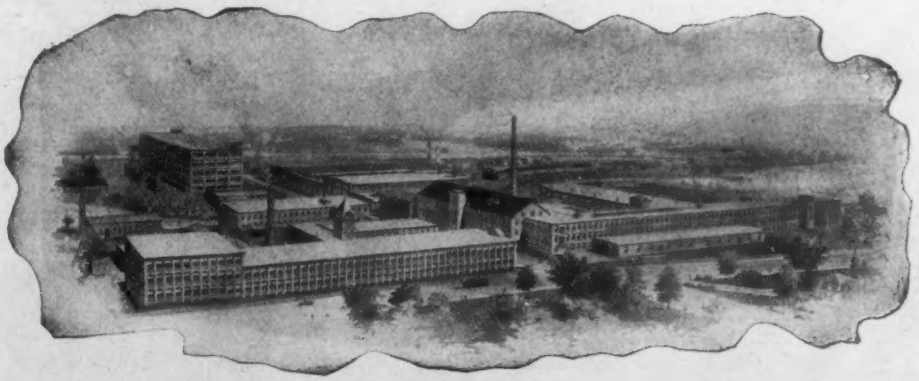
THE DAVIS & FURBER MACHINE CO.

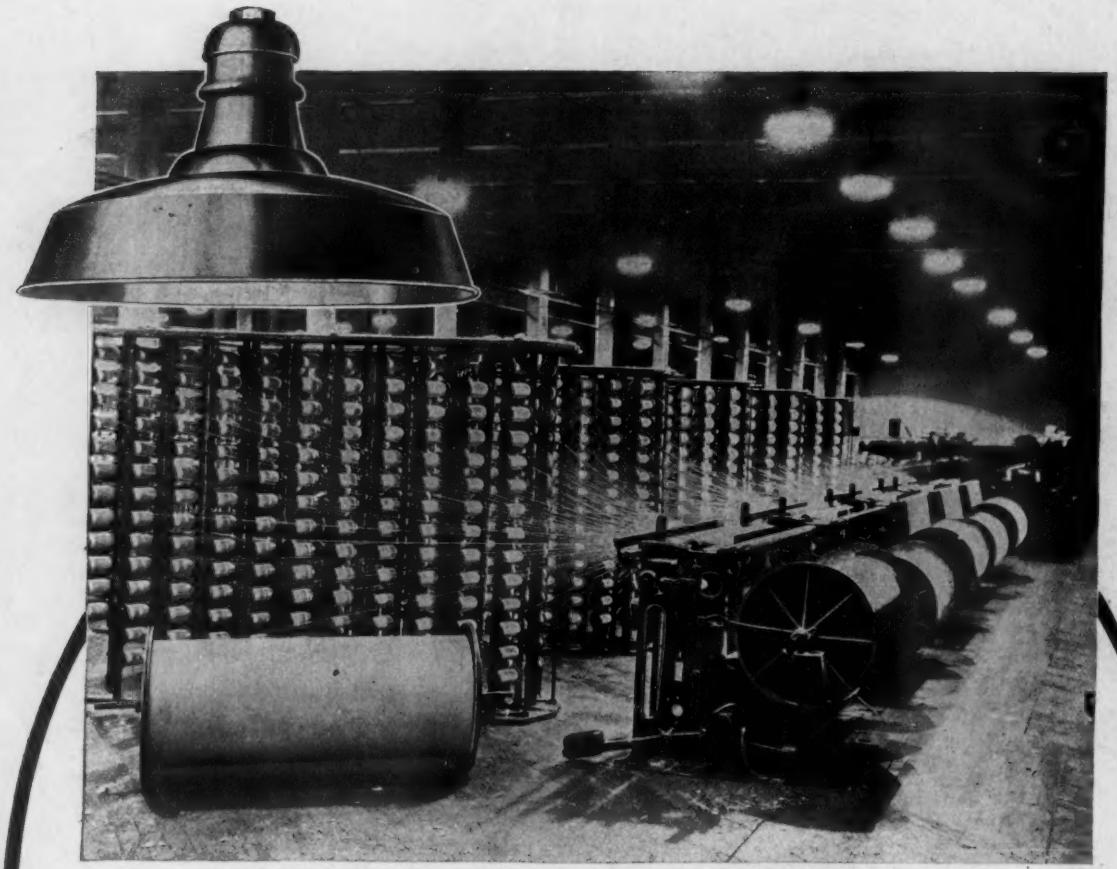
OF NORTH ANDOVER, MASSACHUSETTS.

ESTABLISHED 1832

For 90 years manufacturing the highest type of Textile Machinery for Wool, Worsted, Cotton Waste, Jute, Mohair, Asbestos, Flax Waste, Silk Waste, and Shoddy.

Its Cards, Mules, Nappers, Pickers, Dusters, Tape Condensers, Dressing Machinery, Card Clothing and Napper Clothing are the standard for America and are constantly being exported.





The excellent illumination of this warping room is obtained with

Westinghouse-Cutter Reflectors

The Textile Superintendent now recognizes that good lighting pays dividends not only through increased production of a better quality, but also by greatly decreasing the liability to accidents.

Lighting problems have too often been handled without realization of their vital importance. In the old days glare was considered an indication of abundant light. Today lighting installations are made on an entirely different basis.

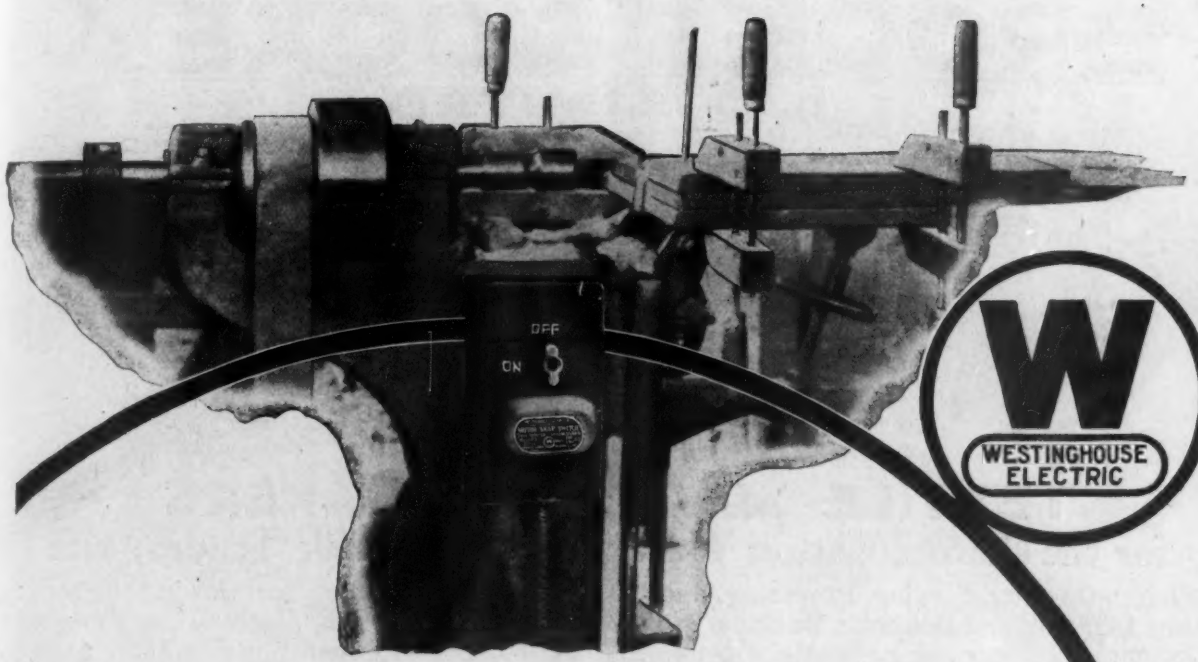
The Westinghouse Illuminating Engineering Bureau has been established to assist those who have illumination problems. Under the guidance of this Bureau all guess work disappears, and the most efficient lighting is assured. Notify us when you desire the assistance of this Bureau.

Westinghouse Electric & Manufacturing Company

George Cutter Works, South Bend, Indiana

WESTINGHOUSE ELECTRIC

Westinghouse



W
WESTINGHOUSE ELECTRIC

—*and liability insurance dropped $162.00*

A box manufacturer of Louisville, Ky., was speaking.

He said his company had installed Westinghouse-Krantz Type WK-20 Safety Motor Starter Switches at a cost of $180 and a later insurance survey resulted in a reduction of $162 a year in the company's liability insurance premiums.

$162 yearly return on an $180 investment! But it happens often.

Type WK-10, 20, 30 and 100, a Safety Motor Starter for evey a-c Motor, from the smallest to 15-hp. capacity.

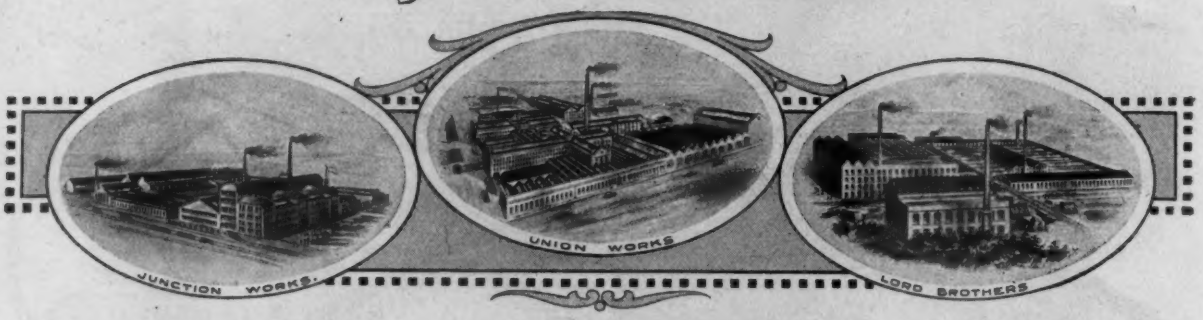
Many other advantages, too.

Ask any Westinghouse dealer or write to the address below for Folder 4500.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania

Westinghouse

BROOKS & DOXEY
(1920) LIMITED



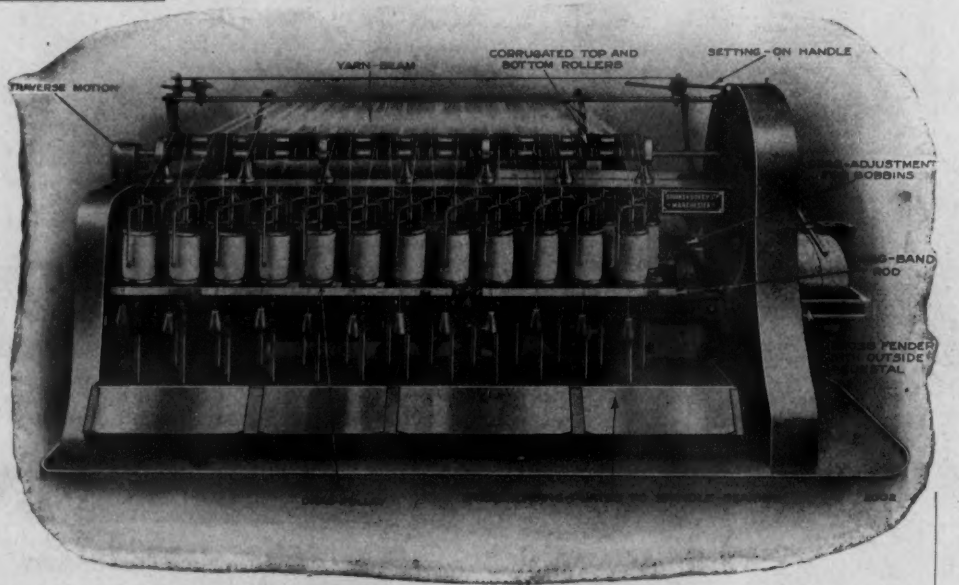
TEXTILE MACHINERY MAKERS
for the Cotton, Cotton Waste, Wool and Silk Trades, viz:

Mixing, Opening, Carding, Preparing, Spinning, Winding and Doubling Machinery for Cotton: Machinery for Waste Opening, Carding and Spinning, on various systems. Self-acting Mules and Cheese Winders for Wool.

Polishing Machines for Sewing Thread: Patent Conditioning Machine for Yarn on Ring Bobbins: Patent Splicing Machine for the "Knotless" Yarn Trade: Roving Waste Openers: Thread Extractors: and Spinning and Doubling Frames for Silk.

Also Tin Rollers, Fluted and Plain Rollers, Spinning and Doubling Spindles, Rings etc.

"Flyer" Doubling Frame



Specially designed for Doubling Yarns suitable for the manufacture of Motor Tyre Cloth, the Doubling being done from Warper's Beams, and the Spindles Gear Driven.

60 years' experience and our reputation for the highest class of Textile Engineering are at the back of every Machine we build. Some of the finest and most efficient Mills in the world have been equipped by us.

Cables: "UNION, MANCHESTER, ENG." Codes: A. B. C. 5th Edition, Bentley's, Lieber's, A-1, and Western Union (Universal)

HEAD OFFICE:- UNION IRON WORKS, WEST GORTON, MANCHESTER, ENG.

INCORPORATING LORD BROS., TODMORDEN.

The economy valve

LUNKENHEIMER "Ferrenewo" Valves

are a real "economy buy" in first cost as well as maintenance. The "Valve-iron" body while costing less than bronze provides a high safety factor for the 150 pound pressure rating for which these valves are recommended, and the seat ring and disc,—the parts subjected to the greatest wear—are made of Lunkenheimer "Valve-nickel," a material possessing extreme wear resisting qualities, insuring long service life. Besides, the **seat ring and disc** and all other bearing parts can be easily renewed.

Globe, Angle and Cross Valves and Horizontal and Angle Check Valves in sizes from ¼ to 2 inches, inclusive.

For handling cyanides, acids and other solutions which attack bronze alloys, these valves are furnished in "All Iron."

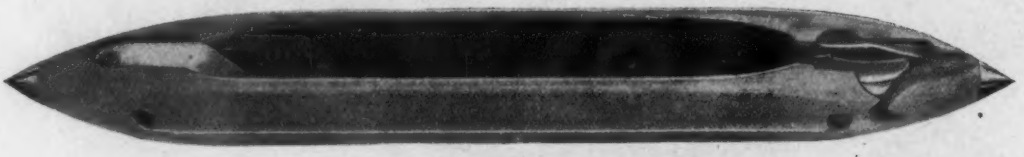
Descriptive booklet No. 567-AK sent upon request.

"America's Best since 1862"

THE LUNKENHEIMER CO.
"QUALITY"
LARGEST MANUFACTURERS OF HIGH GRADE ENGINEERING SPECIALTIES IN THE WORLD
NEW YORK CHICAGO CINCINNATI, U.S.A. BOSTON LONDON
EXPORT DEPT. 129-135 LAFAYETTE ST., NEW YORK

2-16-10

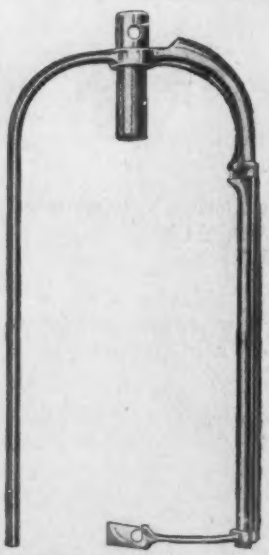
The J. H. WILLIAMS CO.



O. K. Automatic Shuttles
Wire Heddles, Heddle Frames

MILLBURY, MASS.

SACO-LOWELL FLYERS
FOR ROVING FRAMES



A finished product of the highest quality. Made in our own shops by improved methods and tools. Thoroughly dependable and unconditionally guaranteed.

Interchangeable in every way with flyers formerly furnished. Uniform in weight with presser stiff and well balanced. Supplied in any size or quantity. Trial order solicited.

SACO-LOWELL SHOPS
IMPROVED TEXTILE MACHINERY

SHOPS AT

LOWELL, MASS. NEWTON UPPER FALLS, MASS. BIDDEFORD, ME.
Pawtucket Spinning Ring Co., Central Falls, R. I.
EXECUTIVE OFFICES: BOSTON, MASS.
ROGERS W. DAVIS, Southern Agent, CHARLOTTE, N. C.
Southern Branch Office: Greenville, S. C.

THE FUNCTIONS OF THE ENGINEER

TO HELP TEXTILE ESTABLISHMENTS ATTAIN GREATER ECONOMIC INDEPENDENCE

S SERVICE

THE textile mill that carries the manufacturing processes of its cloth to completion—that is, weaves, bleaches, dyes and finishes its product in its own plant, is in an admirable position.

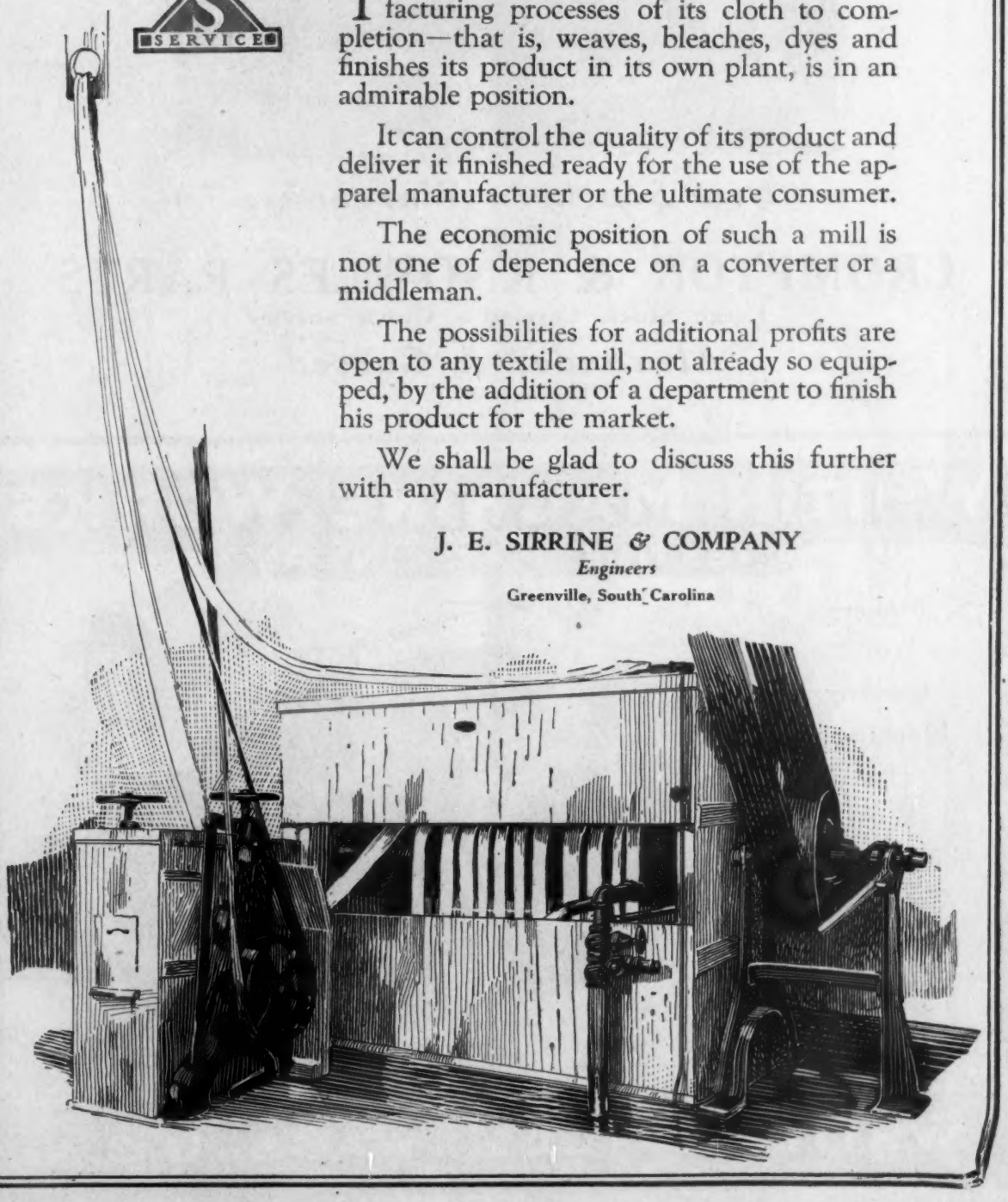
It can control the quality of its product and deliver it finished ready for the use of the apparel manufacturer or the ultimate consumer.

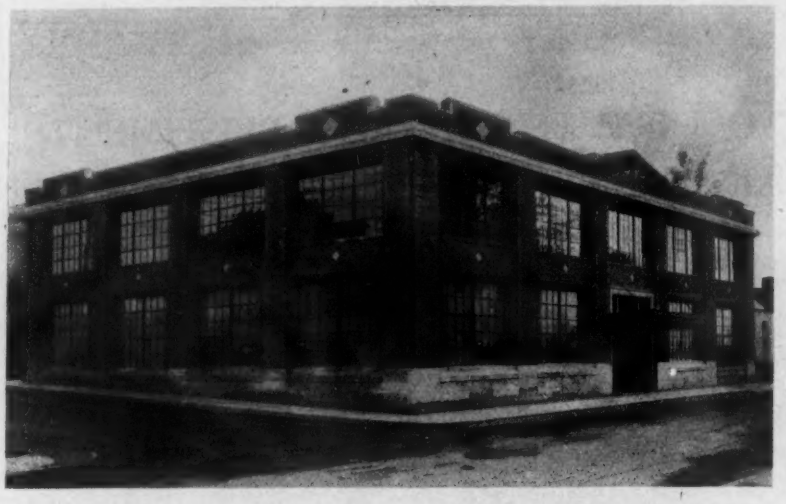
The economic position of such a mill is not one of dependence on a converter or a middleman.

The possibilities for additional profits are open to any textile mill, not already so equipped, by the addition of a department to finish his product for the market.

We shall be glad to discuss this further with any manufacturer.

J. E. SIRRINE & COMPANY
Engineers
Greenville, South Carolina





New Southern Warehouse

Exclusively for

CROMPTON & KNOWLES PARTS

Large Stock Carried — Quick Service

Alexander & Garsed

Charlotte N. C.

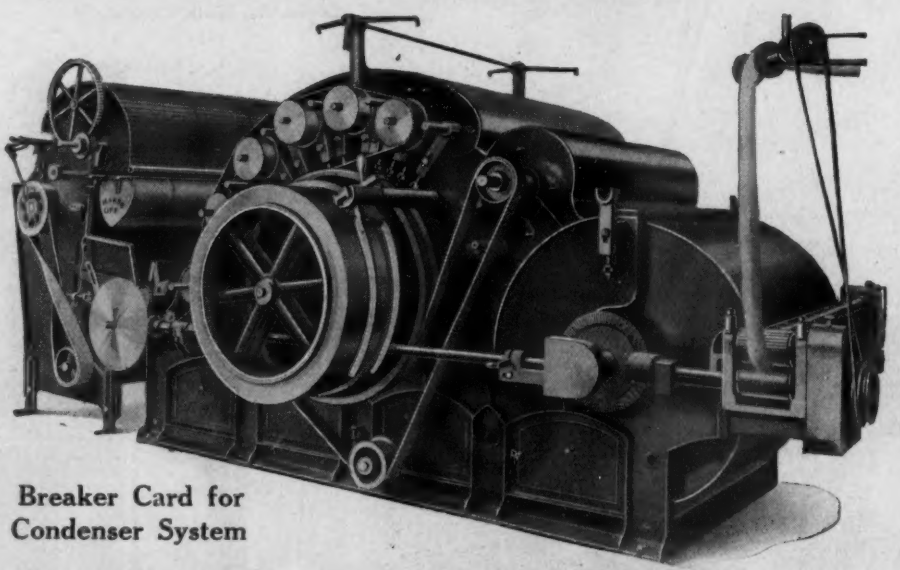
Southern Representatives.

WHITIN MACHINE WORKS

ESTABLISHED 1831

TEXTILE MACHINERY

Makers of Carding Machinery for Wool, Cotton, Cotton Waste Asbestos, Etc.



Breaker Card for Condenser System

MAIN OFFICE AND WORKS

WHITINSVILLE, MASS., U.S.A.

SOUTHERN OFFICE CHARLOTTE N.C.

Paints *for* All Industrial Needs

Why Not Prolong Daylight Working Hours?

Daylight is the best light to work with. All authorities agree to that. And, unlike artificial light, daylight costs nothing.

A few coats of OJACO Mill White applied to walls and ceilings is the surest way to lengthen daylight working hours. Its effect will be to illuminate, with soft reflected rays, all dark and dingy interiors.

OJACO Mill-Whitened surfaces will raise the efficiency of your workers, prevent accidents, eliminate costly errors caused by poor light, increase your output and reduce your lighting bills.

Let the nearest OJACO distributor explain further advantages of OJACO Mill White. You incur no obligation in consulting with him regarding your requirements.

Oliver Johnson & Co., Inc.
Paint Makers
PROVIDENCE, R. I.

TRADE OJACO MARK

MILL-WHITE

Distributor Service

ATLANTA, GA.
Cowles & Bleckley

BOSTON, MASS.
Lewis E. Tracy Co.

CHARLOTTE, N. C.
Charlotte Supply Co.

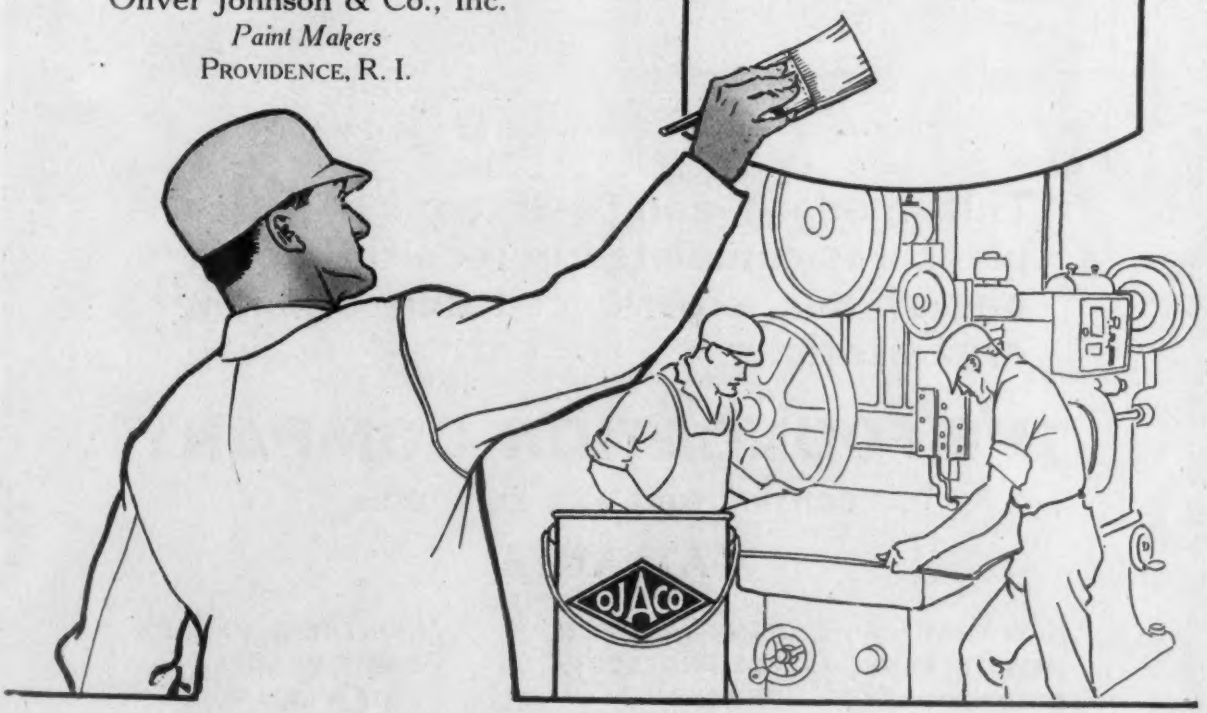
FALL RIVER, MASS.
Wm. F. Harticon

ROCHESTER, N. Y.
F. P. Van Hosen Co.

SYRACUSE, N. Y.
Alexander Grant's Sons Co.

UTICA, N. Y.
American Hard Wall Plaster Co.

WOONSOCKET, R. I.
J. B. Farnum Co.



West End Plant---Atlantic Ice & Coal Corp., Atlanta, Ga.
Morgan & Dillon Architects.

This modern and well equipped Ice plant was completed in record time by one of our experienced and efficient organizations.

THE FOUNDATION COMPANY

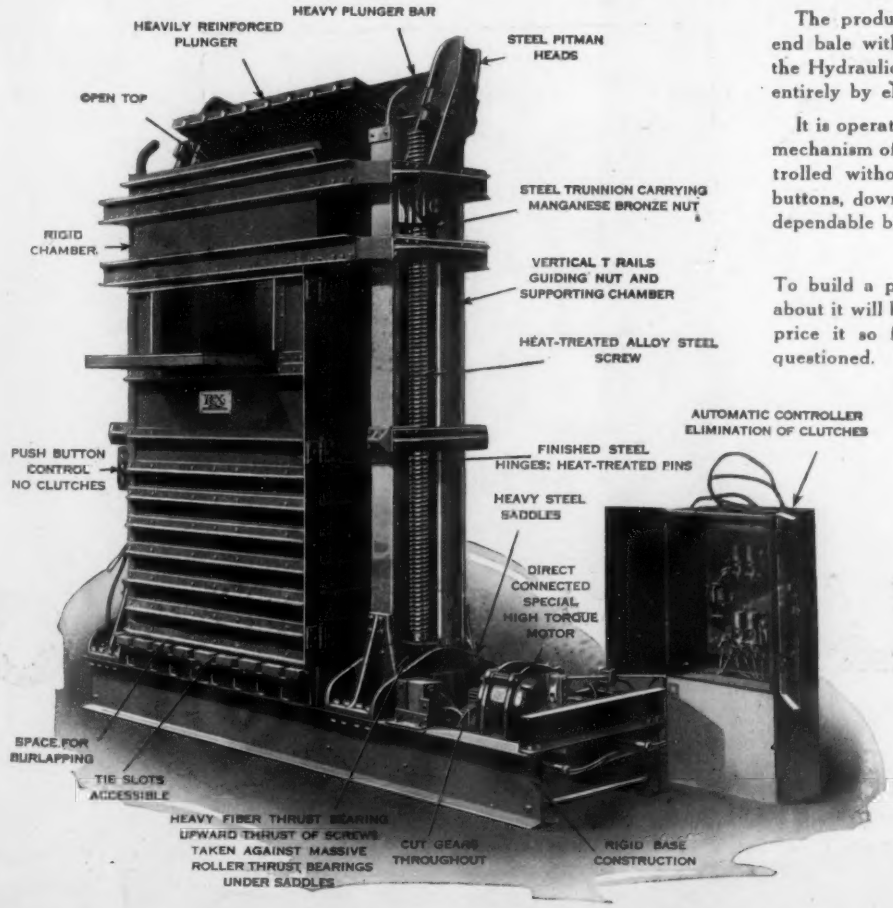
CONTRACTORS AND ENGINEERS

ATLANTA

NEW YORK	SAN FRANCISCO	MONTREAL, CANADA
NEW ORLEANS	LOS ANGELES	PARIS, FRANCE
CHICAGO	PHOENIX	LIMA, PERU
PITTSBURGH	PORTLAND, ORE.	HAVANA, CUBA
DETROIT	VANCOUVER, B. C.	TAMPICO, MEXICO

BUILDERS OF **SUPERSTRUCTURES** AS WELL AS **SUBSTRUCTURES**

Announcing—Hydraulic Pressures Electrically Performed By THE "REX" BALER


HEAVY PLUNGER BAR
HEAVILY REINFORCED PLUNGER
STEEL PITMAN HEADS
OPEN TOP
STEEL TRUNNION CARRYING MANGANESE BRONZE NUT
RIGID CHAMBER
VERTICAL T RAILS GUIDING NUT AND SUPPORTING CHAMBER
HEAT-TREATED ALLOY STEEL SCREW
AUTOMATIC CONTROLLER ELIMINATION OF CLUTCHES
PUSH BUTTON CONTROL NO CLUTCHES
FINISHED STEEL HINGES: HEAT-TREATED PINS
HEAVY STEEL SADDLES
DIRECT CONNECTED SPECIAL HIGH TORQUE MOTOR
SPACE FOR BURLAPPING
TIE SLOTS ACCESSIBLE
HEAVY FIBER THRUST BEARING UPWARD THRUST OF SCREWS TAKEN AGAINST MASSIVE ROLLER THRUST BEARINGS UNDER SADDLES
CUT GEARS THROUGHOUT
RIGID BASE CONSTRUCTION

The product of the "Rex" is a small square end bale with all the compact qualifications of the Hydraulic Press, yet the "Rex" is controlled entirely by electricity.

It is operated by a powerful double screw type mechanism of unique design and electrically controlled without clutches by three simple push buttons, down—up—stop. The fastest and most dependable baler on the market.

The Rex Creed

To build a press so good that the simple truth about it will be adequate recommendation and to price it so fairly that its value can never be questioned.

We unreservedly guarantee 100% satisfaction. Descriptive literature on request.

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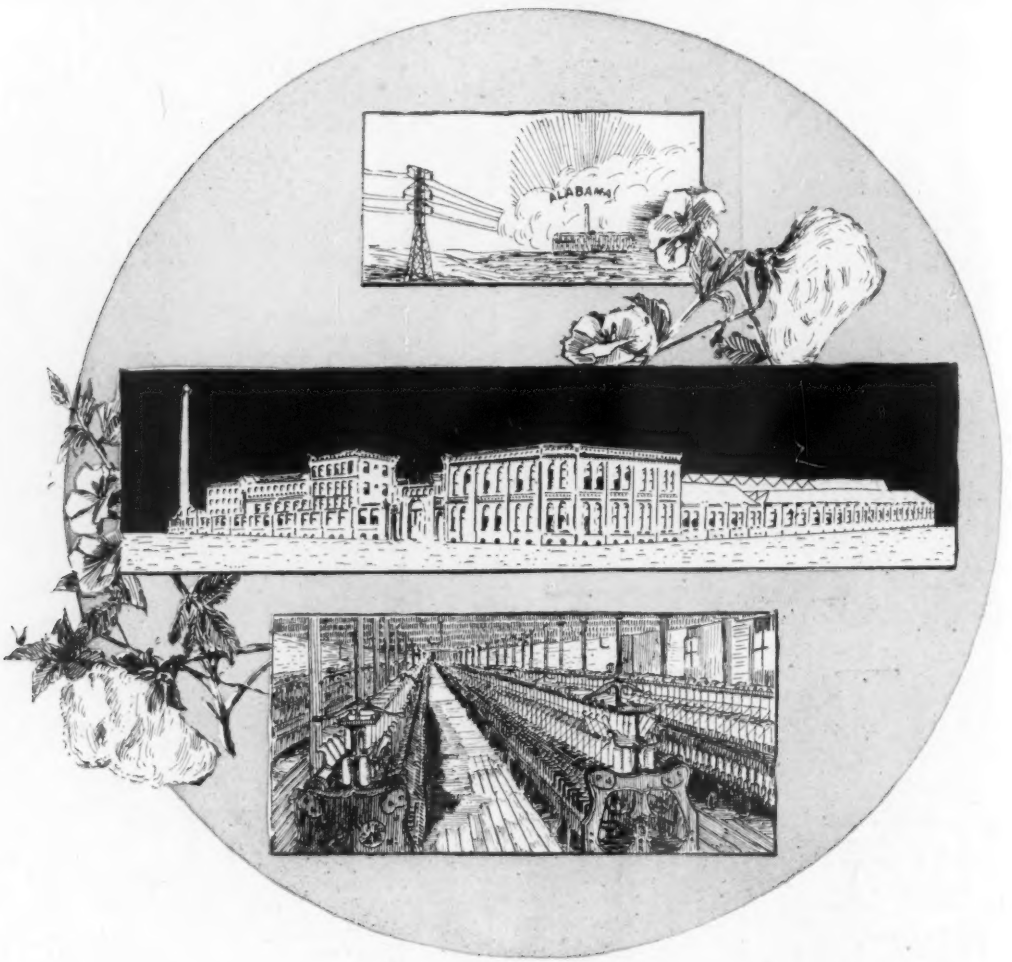


ALABAMA POWER CO

BIRMINGHAM, ALA.

per In Alabama

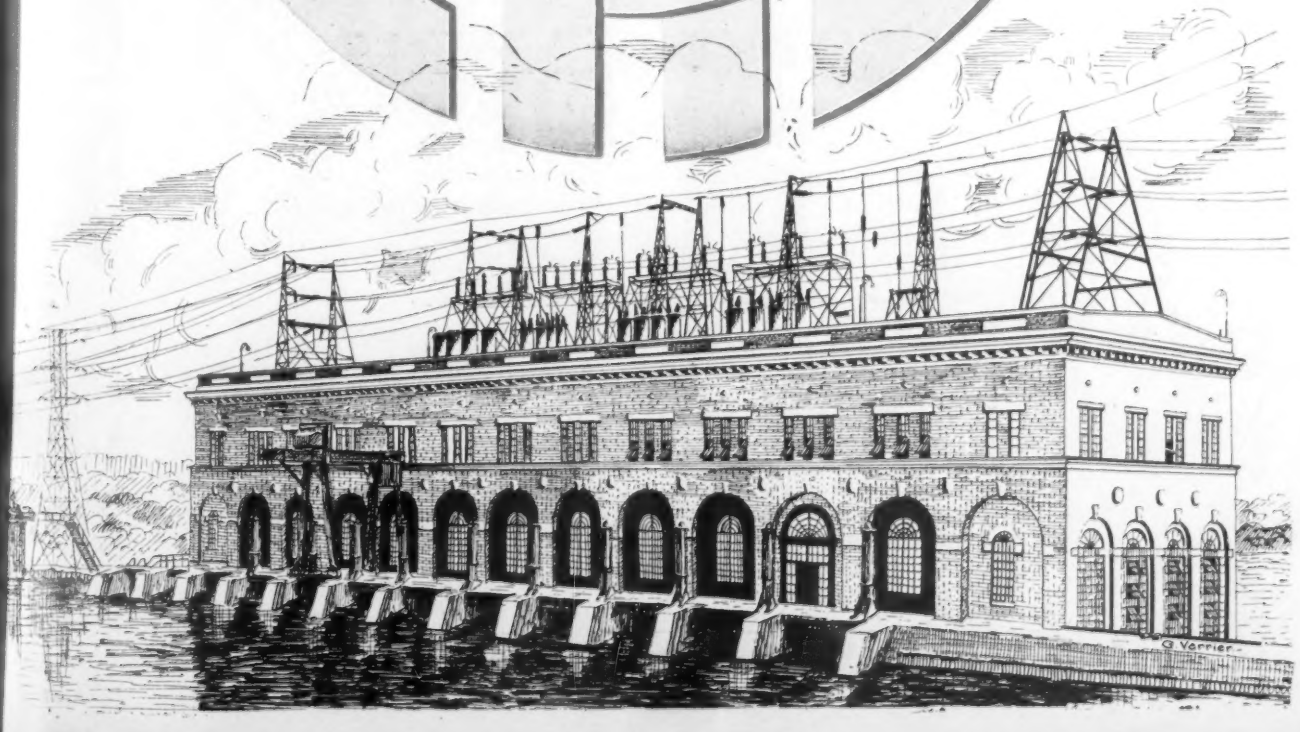
Economy In Manufacturing

Alabama is well located for economy in cotton goods manufacturing; being near the source of raw material; having dependable labor; convenient railways and shipping connections and economical and dependable hydro-electric power.

Good factory sites are abundant in Alabama, either in or adjacent to the corporate limits of cities and towns; located on main line railways, many having street railway service, water for domestic and industrial purposes, and all having ideal climatic conditions. Level factory sites may be secured at a purchase price not to exceed the average price paid for ordinary farm lands, and in some places these sites will be given free of cost to the reputable manufacturer.

Living conditions in Alabama are unexcelled. "An income of $2,000.00 a year in the South is worth about twice what it is in the great industrial centers of the North," says a recent editorial in the New York Sun and Herald. This is attributed to the climate and circumstances which make housing costs relatively low, fuel bills light, heavy and expensive clothing unnecessary, and food more plentiful and cheaper. This difference in the cost of living has been estimated by Mr. W. D. Adams, Secretary of the American Cotton Manufacturers Association to average $4.36 per week in favor of the Southern operative.

Detailed information will be furnished upon request.



As a magnet attracts steel, so do properly graded, surfaced and drained thoroughfares attract capital and build up a community to the pinnacle of efficiency and prosperity.

Streets That Invite Traffic Enhance Property Values

THE proof of this proposition is shown in the recorded enhancement of values in every community where Armco Iron Culverts have been installed. Permanency of road improvement is insured by their use, for they furnish the most satisfactory solution to every drainage problem.

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are low in first cost of material and installation, unbreakable, removable with minimum labor and insure an extraordinary service life of constant and unvarying duty. Strong as a steel bridge, they sustain, with unimpaired vitality, the heaviest and most congested traffic that can be brought to bear on them; they are the very life of the roadbed under which they are laid.

Our research and engineering department will gladly give you the benefit of their extensive experience and knowledge, upon request and without obligation.

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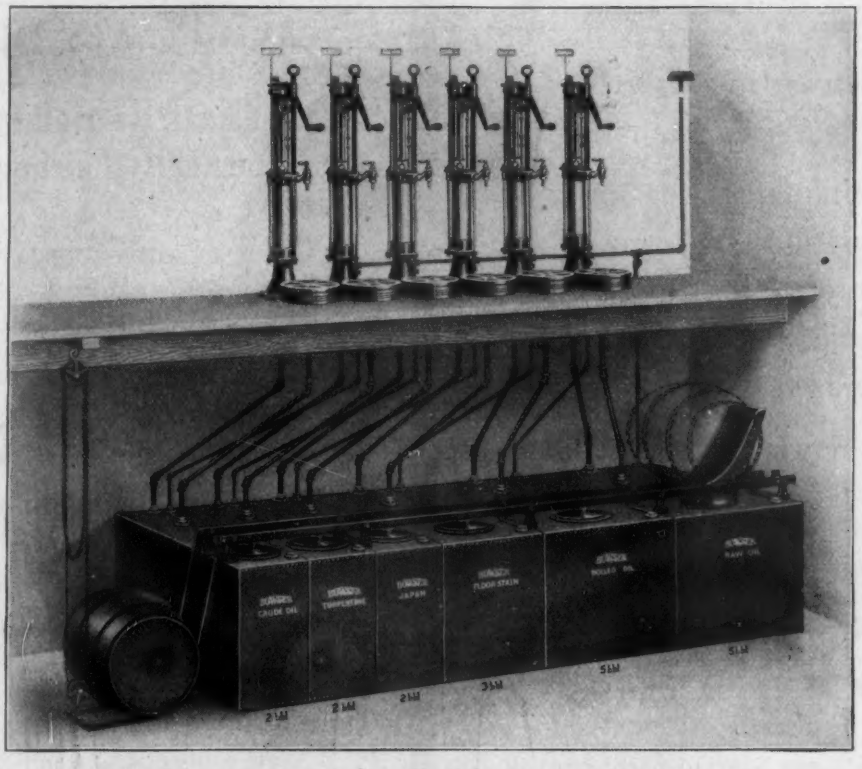

Where Does Johnson's Wife Store the Granulated Sugar?

When Mrs. Johnson takes home a couple pounds of granulated sugar, does she store it in the paper bag? No, she empties it into a tin container where it is safe and where she gets all the sugar that her money buys. She knows that paper bags are leaky and easily broken.

Here is an example for the manufacturer to follow in storing paint oils. If Old Man Johnson has to get your paint oil out of a "system" of barrels, some of the oil will be wasted, some of it will leak, and every now and then a barrel will be broken.

Bowser equipment provides an absolutely efficient storage method. The tanks prevent leakage. The Bowser piston-type measuring pump insures accurate measure, and there is no time wasted in going to the storage room for oil, because with the Bowser system the oil is stored where it is used.

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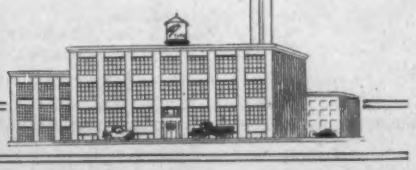

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Our service to the textile mills is the result of years of experience in installing textile theatre equipment. Our representatives call upon the mills personally, lay out the plans, advise on the proper equipment required and finally supervise the installation and the starting of the theatre. In other words, they take the whole problem off from your hands and do not turn over the work to you until the theatre is operating satisfactorily.

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We have a special offer for the Textile Mills. May we present it to you?

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The eccentrics located in the box MUST be kept at an even temperature to insure their maintaining the finely adjusted distance of the comb from the doffer cylinder and the even running of the sliver. It is only by maintaining this adjustment that the sliver runs even, and a lubricant that can be depended on to meet these conditions perfectly is

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Texaco Comb Box Lubricant is made especially for the purpose. It brings with it the freedom from mechanical difficulties in the comb box and because of its long life in use, is exceptionally economical.

Texaco Comb Box Lubricant is different from the lubricants offered for sale or now in use, and to prove conclusively that it is adequate for the work, we have only to cite two points:

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2 **In every case we have shown that with Texaco Comb Box lubricant there is a considerable reduction of frictional temperature in the box. Sometimes this difference exceeds 15 degrees.**

There is a Texaco Lubricant for Every Need of the Textile Mill.

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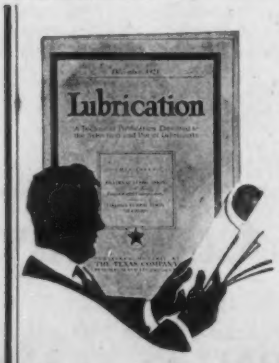

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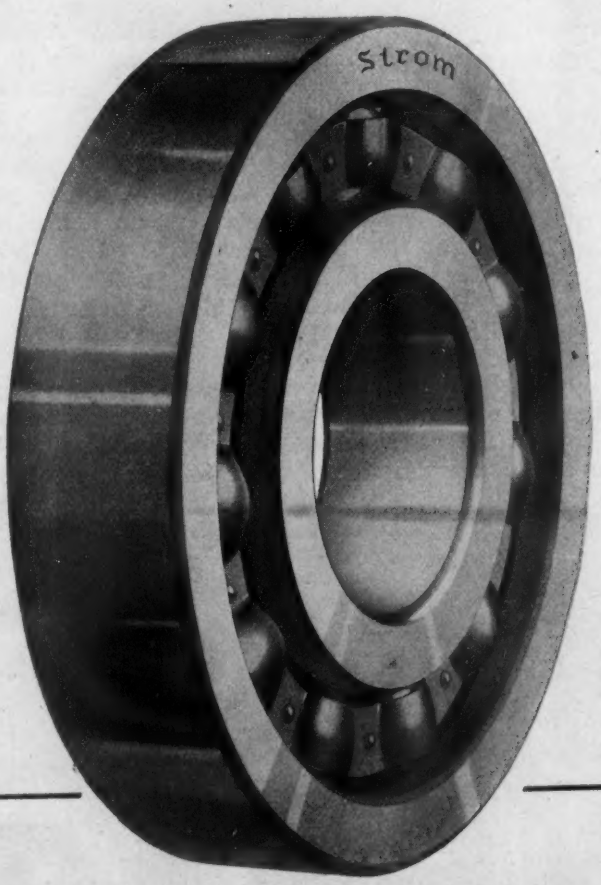
Strom BEARINGS

An extract from the manuscript of the report at the annual meeting of the Southern Textile Association, Wrightsville Beach, N. C., June 2 and 3.

W. C. Cobb, of Ware Shoals, spoke as follows: "About two years ago I began to experiment with ball bearings on pickers. A salesman came around and talked ball bearings on pickers until, to get rid of him, I tried them on one set of machines, though I didn't know just what I was doing myself. Finally I had a man go from my office and weigh the laps from these pickers. Then I had him weigh the laps from all the pickers, as we had been putting back about 40 per cent of the laps; and by laps I mean the whole lap, not a single yard. I finally equipped all the aprons and eveners and we are now getting less than one per cent of the laps set back."

"I have to bring my goods up to a certain breaking strength," continued Mr. Cobb, "and anyone who has never been up against that doesn't pay much attention to the small things. But when the selling agent gives you just so much, say 75, you begin to look around for the little things. You will get busy and look around and see what is causing the trouble when you get some bad reports. I began in the picker room and I was surprised when I saw that I was throwing back 40 per cent of my laps. You understand the operator wasn't throwing back 40 per cent all the time; he wouldn't make that much work for himself. But when I put a man in there, and said, 'Throw back every lap that is not up to standard.' I saw what I was getting. I equipped my picker room with ball bearings all the way through, and kept that man in there, and some days now we have perfect reports."



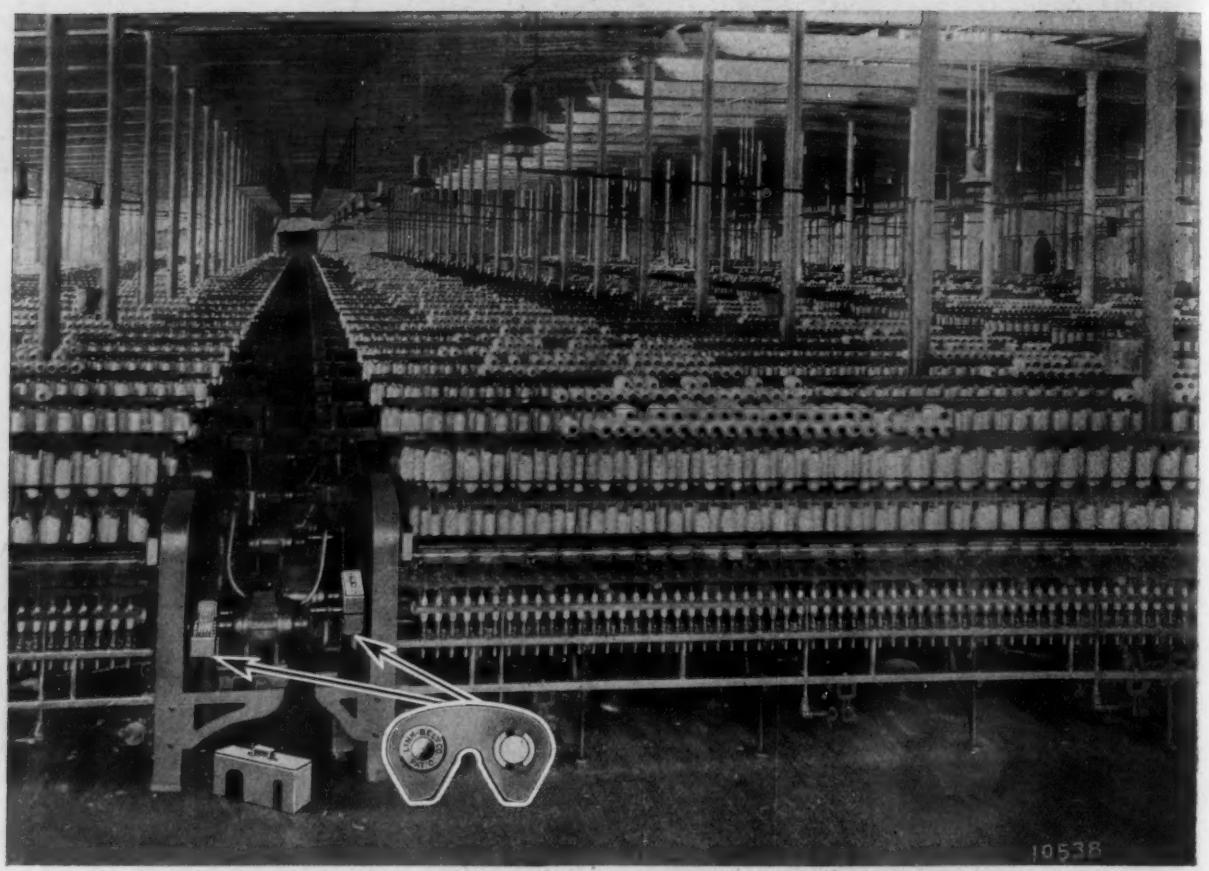
For further information on textile applications write the Aldrich Machine Works, Greenwood, S. C.

U. S. Ball Bearing Mfg. Co.

(Conrad Patent Licensee)

4544 Palmer St. **Chicago, Ill.**

(214)



GETTING THE MOST OUT OF YOUR EQUIPMENT?

SPINNING machinery is costly. It represents a big investment. Your returns on this investment are dependant on two factors—labor and the machine's efficiency.

You cannot always control the productiveness of your help. But you can govern the efficiency of your machinery.

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Put your power transmission problems up to our experienced textile drive engineers. Their advice will cost you nothing—may save you much. You will be interested in our book No. 425 entitled "The Ideal Drive for Textile Machinery". Send for a copy.

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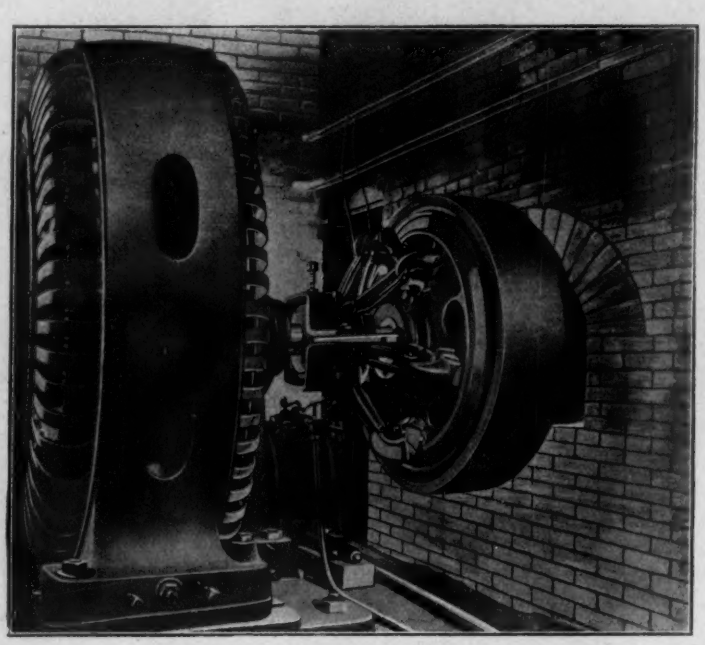

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If you want further details of this kind of service write for our "Belting Booklet." It is full of useful belting data and contains definite information on installations, uses, etc.

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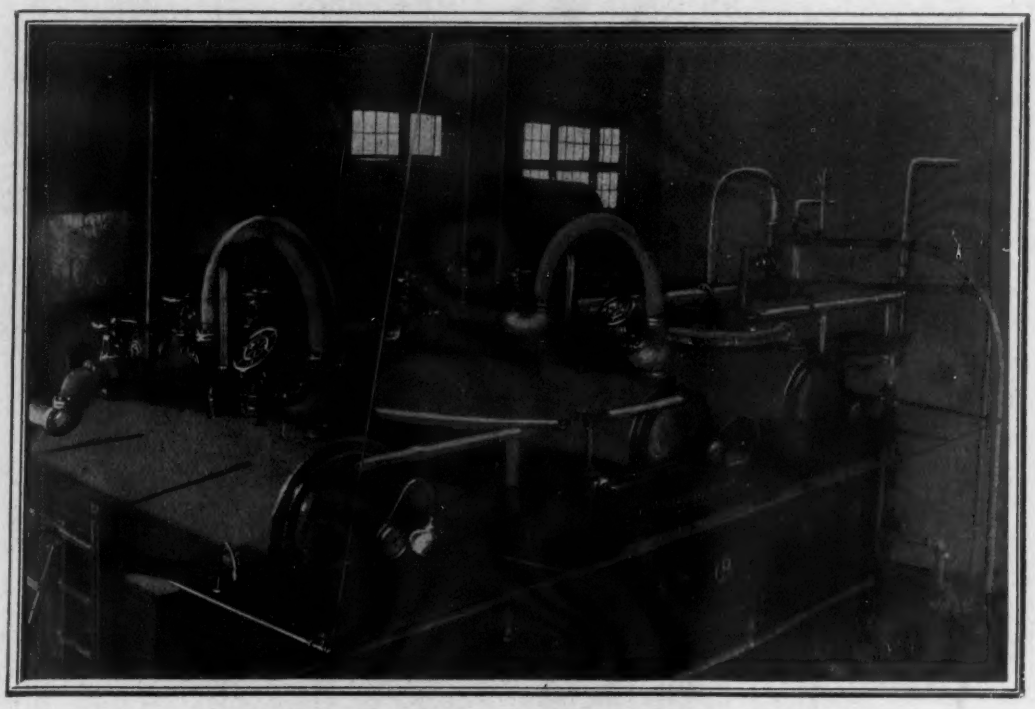

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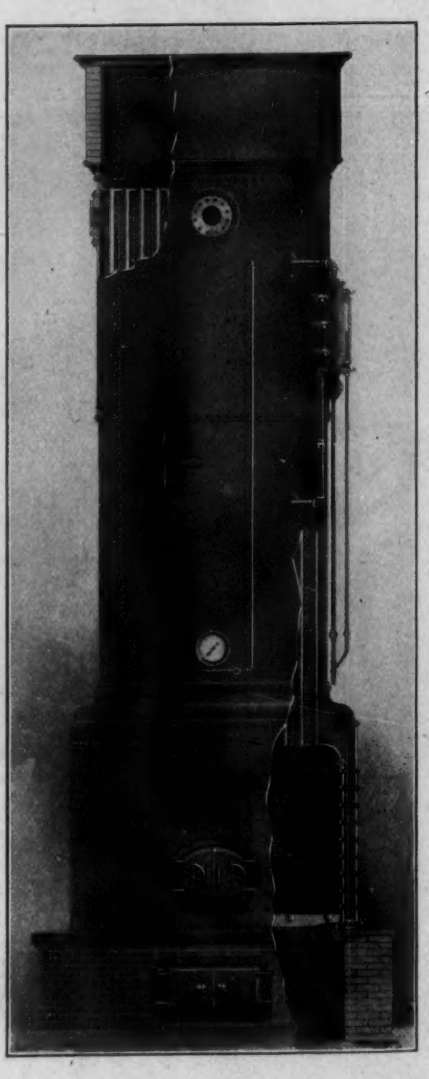

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Adapted for Mill Work

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Southern Representative,
Isaac Hardeman, Charlotte, N. C.

BOSTON
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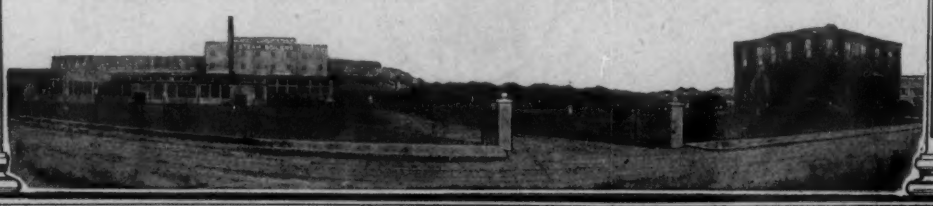


An unretouched photograph of a cloth room in a southern cotton mill, equipped with IVANHOE RLM reflectors and bowl-enameled MAZDA lamps.

Shorter Days and Better Lighting

You "turn on the lights" earlier each day, now that summer has gone. The mornings and evenings are dark for a longer time, and the dark days come more often. Furthermore your rush season is at hand. But you can maintain daylight efficiency this fall if your plant is properly lighted with IVANHOE RLM reflectors and bowl-enameled MAZDA lamps.

These scientifically designed metal reflectors, porcelain enameled green on the outside and white on the inside, direct the light you pay for on the working plane where you want it. They give you value received for every dollar you spend for current. And they enable you to get more out of your mill in the way of product and profit, for good textile mill lighting accomplishes six desirable ends—

First, it increases production because workmen can see more quickly. **Second,** it betters employee morale. **Third,** it enables workmen to see machines runing idle. **Fourth,** it decreases spoilage, often as much as 50%. **Fifth,** it makes possible proper sanitation. **Sixth,** it prevents many minor accidents.

As a matter of fact, good textile mill lighting is an investment that pays six dividends every working day. Mill executives in every textile center have demonstrated that in their own plants and to their own satisfaction.

Is your plant lighting adequate? Are you ready for the fall and winter days and the rush season just ahead? Near you is an IVANHOE distributor who will be glad to advise you without charge. See him at once, or write to us direct.

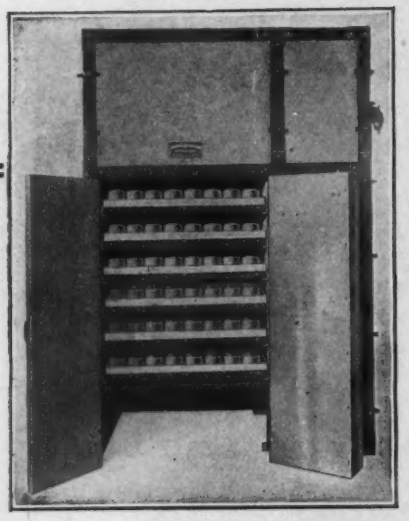
IVANHOE-REGENT WORKS of General Electric Co.
Cleveland Ohio

"Ivanhoe" Steel Reflectors Lighting Glassware, Anderson Self-Adjusting Arms, and Illuminating Service.

"SERVICE TO LAMPS"

IVANHOE

GLASS SHADES - STEEL REFLECTORS



This dryer, especially constructed for drying yarns that have been dyed by the Franklin Process, contains the strength and rigidity that have always been a feature of other Grinnell Textile Dryers.

GRINNELL
TEXTILE DRYERS

AUTOMATIC YARN DRYERS
For drying Cotton and Wool Yarn in Skeins.

AUTOMATIC STOCK DRYERS
For drying Cotton Wool, Hair or Noils.
Carbonizing Dryers for Noils and Rags.

AUTOMATIC LOOPING DRYERS
For drying Cotton Piece Goods, Plush, Carpet, Toweling and Underwear.

PACKAGE TYPE DRYER
Especially designed for drying yarns dyed by the Franklin Process.

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For drying Cotton and Wool Yarn in Skeins.

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Drying Systems applied to Tentering Frames.

Superior Mechanical Construction Increases Grinnell Dryer Efficiency

The unequalled efficiency of Grinnell Textile Dryers is due in great part, of course, to their superior operating principles—to the large volume of moderately heated, slow-moving air, which, where necessary, travels spirally against the material to be dried, and insures uniform drying with a minimum of fuel and power.

But the right drying principle alone is not enough. Right mechanical construction is equally essential. Consequently the best thought of our organization has been concentrated on the elimination of those features which make the older types of drying machinery wasteful in operation and costly in upkeep.

Instead of the one-half inch insulation which is commonly used, panels of Grinnell Dryers are insulated with a full inch of specially selected and prepared air-cell asbestos. The framework, too, is thoroughly insulated.

The housing of the dryer consists of heavy gauge pressed-steel forms with panels of two thicknesses of galvanized sheet steel which exactly fit these frames.

The heating coils are made in our own plant. They are designed and placed with the utmost care, and before leaving our shops are tested to 175 pounds hydraulic pressure.

Only our knowledge of heating problems, acquired through 70 years of experience, has made it possible for us to embody so successfully the right drying principle into a thoroughly practical and economical machine.

Write for our illustrated booklet, or let one of our engineers explain to you personally and in detail, how Grinnell Dryers will save you time and money. Address Grinnell Company, Inc., 266 West Exchange St., Providence, R. I. Selling Agents for Southern States: G. G. Slaughter Machinery Company, Greenville, S. C.

GRINNELL COMPANY

Automatic Sprinkler Systems | Steam & Hot Water Heating Equipment | Humidifying and Drying Equipment | Fittings, Hangers and Valves | Pipe Bending, Welding, etc. | Power and Process Piping

If it's Drying, take it up with us

COTTON

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More Broad Looms Equipped With Hyatt Roller Bearings

Twenty 90″ sheeting looms have just been built by the Hopedale Manufacturing Company for the Pepperell Manufacturing Company of Biddeford, Me. and equipped with Hyatt roller bearings.

This mill by specifying Hyatt roller bearings on these looms will secure the most modern, most economical equipment—the kind that pays for itself in decreased cost and dependable, uninterrupted operation.

Since Hyatt equipped *narrow* looms have shown a power saving of 23.4%, it is only natural to expect that the power saving on these *broad* looms will be even greater.

One good feature of Hyatt bearing looms that will make them popular with the weavers at Pepperell has been expressed by several mills as follows:

> "The weavers find the looms are much easier to handle when it is necessary to turn the crank shaft a part of a revolution in order to put up an end."

These looms will require oiling only three or four times a year and the bearings will give their economic service throughout the life of the looms.

Specify that your looms be Hyatt equipped and secure real dependability and economy.

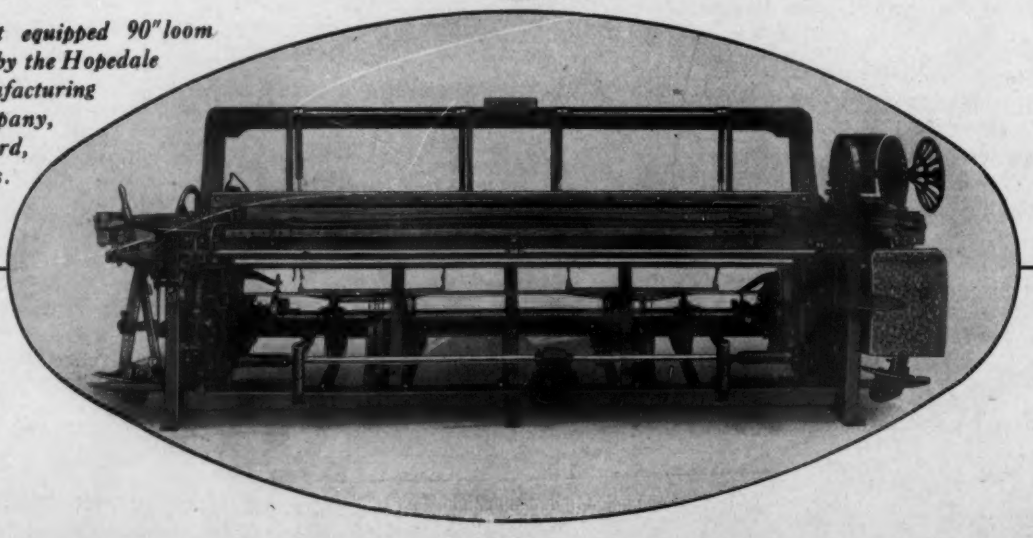
Hyatt Roller Bearing Co.
Motor Bearings Division, Detroit
Tractor Bearings Division, Chicago

Industrial Bearings Division

USE HYATT BEARINGS ON YOUR LINE SHAFTS TOO BULLETIN 127

New York, N. Y.
Pacific Coast Division
San Francisco

Hyatt equipped 90″ loom built by the Hopedale Manufacturing Company, Milford, Mass.



With the Publishers—

Did You Ever Push a Lawn Mower?

Do you remember when you bought your first lawn mower and how proud you were of it?

Do you remember how you hung your coat on the veranda rail, carefully oiled the mower, and the apparent ease with which you mowed the first straight path right through the middle of the lawn?

And do you remember how you looked back from the end of that first swath with the satisfied feeling that all the grass in that particular area would be about an even two inches long?

And how it wasn't?

Remember the long individual spears that lifted their defiant heads from that clipped area in spite of you?

Do you recall how much harder that mower pushed as you widened out the mowed area, and how it seemed that you would never reach the end of what was at first only a little piece of lawn?

Remember how your wife laughed when you rolled up your sleeves and dug in with the determination that you would mow that lawn if it took all summer?

And how it looked like it was going to?

And do you remember when it was all done the great number of those individual spears that remained and demanded special attention?

Sure you do. But did you ever stop to compare that experience with your experience in the advertising field and note the similiarity?

Remember your first two-page splash and how proud you were of it?

And remember how disappointed you were when it didn't knock down every prospective customer in the field and bring him into your fold?

Do you recall how much more effort it took to approve the bills for space each month as the months rushed by at an unheard of rate, while the sales department seemed to be asleep on the job?

And how somebody told you that the business paper you were using was no good and didn't reach the people you wanted?

That if you would use a different one you would soon push Rockefeller off the peak?

And how you got sore at the knockers and kept pounding away at your prospective customers in your own way?

Do you remember how you finally found you were covering the field and doing business with most of them?

And that the proportionately few remaining stood out like those long spears of grass in the lawn?

Remember how you went after those individualists with special methods?

And how you finally won over some of them?

And the others are excellent exercise to keep the sales department on its toes?

So there is a similarity between mowing lawns and advertising.

You learned early in the game that a regularly clipped lawn looked better and mowed easier.

Just so with advertising. The irregular advertiser gets lost in the tall grass and is forgotten between times, while the man who comes to bat every month keeps out the high grass and has his business lawn looking like velvet.

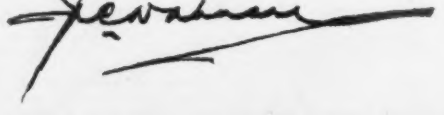
AMONG COTTON'S READERS

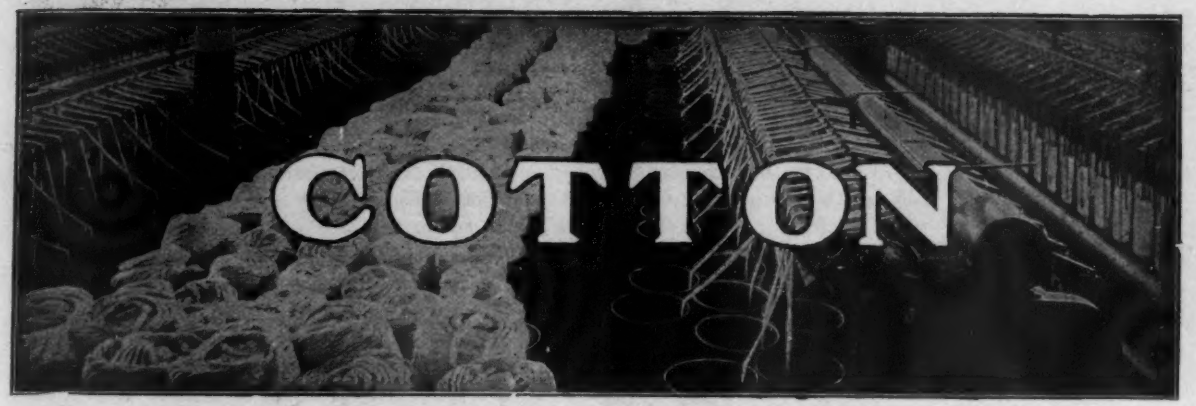
J. C. Dobson,

President and Manager The Texas Hosiery Mills,

Dallas, Texas.

"Your monthly journal is an excellent magazine and I read each copy with a great deal of interest. It contains technical information applying to all departments in our plant and is a source of valuable information for the heads of our different departments."





September, Nineteen-Twenty-Two

An Open Door Versus Back Stairs.

President Harding has revived the suggestion that cabinet members be given seats and voices on the floors of the two houses of Congress. It is an eminently good suggestion. If there is any of our citizens to whom it should appeal it is those who have had experience in directing or managing the affairs of corporations.

Off-hand one might think that the issue involves a mere question of political science, fit for discussion only by professors and those deep thinkers who write for the heavy types of magazines. It would seem to have little of that practical potency and immediate importance that adheres to what Congress did yesterday or what the President or a member of the cabinet may do tomorrow. But it bears very pointedly on those things as well as on the elemental principles of government. For if members of the cabinet had seats in our national legislative body the actions of Congress often would be more intelligible, even if not more praiseworthy. And the performances of the executive departments could not be clothed in the deep mystery which too often surrounds them.

In fact, to touch briefly on the political science of it, it was never intended by the founders of the Government that cabinet members should not sit in Congress. All that the Constitution does is to give Congress the right to say who shall take part in its discussions. It was assumed that the age-old rule of representative government by which legislative bodies insisted on the presence of ministers would prevail. This is shown by The Federalist which was written by the chief makers of the Constitution. History also shows that the fixing of a contrary rule was more a trick of strategy than a setting aside of principle. Hamilton expected to go in person on the floor of Congress and advocate his plan for establishing the national credit. Those who were opposed to that plan feared the power of his voice; they did not want to meet him in open debate. So they slipped into a resolution calling for his famous report on the national credit the requirement that he communicate with the Congress "in writing." That's how the rule barring cabinet members from the floor of Congress happened to be made. Even in that case it did not suffice for the purpose intended. Hamilton finally won his point, but, to do so, he had to resort to back stairs methods. When he couldn't appeal directly to Congress itself, and through it to the country, he made deals with individual members and groups of members of Congress whereby the adoption of his financial scheme was brought about. Incidentally, the city of Washington, in a way, is a monument to the first practice of "trading" between an executive department and Congress. It was established on its present site in return for votes which secured the adoption of Hamilton's plan for giving the new government a sound credit.

The oft-made statement that our scheme of government rests on the independence of departments is untrue. The Constitution itself makes the departments interdependent. The President has legislative power; the Senate has executive power. Nor are free or representative institutions dependent on any such unworkable principle. The freest and most representative governments in the world make ministeries directly responsible to the national legislative body.

We cannot go that far without changing the Constitution but there is no reason why Congress and the executive departments should not work together freely—in the open. They cannot do it, however, so long as a stone wall stands between them, and all kinds of secretive underground and backstairs passageways are used in dealing with each other.

Anyone who knows how things are done in Washington, knows that formal communications between Congress and the executive departments mean next to nothing. Informal communications mean everything. Deals and dickering have much more weight on legislation and administration than open discussions carried on "in writing" between the law-makers and the administrators.

Suppose your board of directors were not permitted to communicate with the president or superintendent of a factory except "in wiring." Suppose that boards of directors and the executives of corporations were held separately responsible by stockholders. Suppose that, instead of free discussion between board and executives, there were substituted secret dickering between members of the board and different executives. Yet that substantially is the way our greatest business enterprise, the Federal Government, is operated so far as Congress and the executive departments are concerned.

And that is one reason why the public knows so little of the actual whys and hows of much that happens in Washington.

If cabinet members were required to attend certain sessions of Congress they would be questioned publicly as to any matters relating to their departments. They

could press their proposals on Congress openly. A weak member of the cabinet inevitably would be showed up to the country; as it is he can escape by passing heavy burdens on to subordinates. The floors of Congress again would take on a meaning that they long ago lost; for legislation no longer is shaped in the open forum but in committee rooms and lobbies and in byways unknown to the Constitution.

Thus cabinet members on the floors of Congress would mean much more to the legislative than to the executive department. The change might restore the House of Representatives to some measure of the prestige it once possessed and to something like the dignity of the English House of Commons.

Above all it would clear up much of the confusion that now obscures the conduct of national affairs.

The establishment of a budget system was a step in that direction; the change urged by President Harding would be an equally long and decided move forward.

And Congress which, sadly, has become a free subject for cheap wit and scornful joke, should be the last to stand in the way of it.

The Manager's Problem.

The ambition on the part of every amateur band man to play the lead cornet is a healthy sign of a desire for advancement. It should not be discouraged. But when that ambition reaches a point where the second cornets, the second and third trombones and the second and third altos are all trying to play the same part as the solo B-flat cornet, then the harmony of proper arranging and instrumentation is lost, and the result is unbalanced and discordant.

Special mention has been made of certain instruments not because those particular instruments will be more discordant than any of the others if playing the wrong parts, but because the parts assigned to them are simple and uninteresting. The work usually assigned the other instruments is sufficiently difficult to keep these players absorbed, but those on the dull, easy harmony vamping are always trying stunts, frequently at the most inopportune moments, to the disgruntlement of the bandmaster.

Heads of industrial institutions, like cotton mills, are but bandmasters in another sphere. Their players manipulate machines instead of instruments. Each individual employee accomplishes a certain important thing—sometimes seemingly inconsequential—frequently monotonous and uninteresting—but nevertheless important and necessary if the finished product of the plant is to achieve and maintain a desirable reputation for quality. Frequently the principal problem of the mill manager is to stimulate the ambition of these day wage workers, to create in them a desire to play the "lead cornet," if the simile is permissible, and at the same time make them understand the true value and importance of their routine work, the harmonious undertone, if you please, that is so necessary for any perfect result, whether it be the perfect rendition of a musical composition or the production of a perfect piece of cloth.

How this problem is solved in some mills and by some superintendents is occasionally described in COTTON. In the August number several articles were devoted to the educational methods being developed at certain mills and groups of mills and, in some instances, the results that were being obtained were shown. On another page of this month's issue is a story telling how a superintendent talks with his operatives in an endeavor to build up morale, which is the the basis upon which teamwork as well as individual interest is founded. The musical development at the mills of Senator Comer, also described in this issue, is another angle on the situation.

These are but characteristically individual viewpoints on methods for the solution of the problem outlined. They evince the desire to aid in the creation of a more efficient working force. But they are also indicia pointing to a real need that has been uncovered in industrial organizations. Probably many other methods have been evolved to obtain this same result and we shall be glad to have our readers advise us of what they are doing to lead the operatives to brighten the corners where they are, to breed contentment among them, to induce a feeling of loyalty toward the mill and village, and at the same time to stimulate their ambition for positions higher and better, more responsible and more remunerative.

Southern Textile Exposition.

Everyone is looking forward to the Fifth Southern Textile Exposition to make a name for itself as not only the largest, but the most successful and interesting one yet. And from all reports no one is to be disappointed, if advance arrangements and plans are any indication. As has been reported, the Fifth Exposition will be held at Textile Hall, Greenville, S. C., from October 19 to 25 inclusive. All available space, the management says, even unto the balcony, has been contracted for, and this insurance of plenty of exhibits, with the added indication of a well balanced and diversified list of products to be exhibited, means that this show, just like each of its predecessors, is going to surpass the previous one, and will, to coin a new expression, be bigger and better than ever.

Further indications are that considerable new machinery, equipment and devices will be presented to southern mill men's attention for the first time at this show, while other exhibits will include products absolutely new. It is well known that during the time intervening since the Greenville show in 1920, a multitude of up-to-date and efficiency-producing items for the textile mill has been developed, which will be one of the interesting features of the Exposition next month.

The Exposition management, utilizing past experience, will inaugurate at this year's show a number of new ideas and arrangements. One of these is that the show will begin on Thursday morning, being open on Friday and Saturday, but closing for Sunday, the 22nd, to give exhibitors and visitors a day of rest, and re-opening on Monday morning and continuing until Wednesday night. Another new plan of the management which should prove a convenience and comfort is the construction of two flights of stairs to the balcony from the stage, one flight on each side. These steps are 36 inches wide and have a landing half way up. They are heavily constructed, and the arrangement should be considerably less confusing than in former shows, when all traffic to and from the balcony used the same stairways at the front of the building.

Testing Cotton Fabrics for Strength

BY A TESTER.

In a previous article, "Testing Cotton Yarn for Strength," the writer endeavored to point out that the word "strength" is a relative term. One yarn of the same weight and grade might show quite a difference in strength. This difference would be due to a difference in moisture content. Furthermore, the tests should have due regard for the weight of the sample tested. Yarn sold for 8's/3 ply may size 7s/3 ply and with the same moisture content, this yarn would have a proportionately greater strength as its weight is greater.

This variation resulting from moisture and weight also holds for fabrics. Adjustments must be made for weight by direct proportion. That is, select a standard weight per square yard for the fabric to be tested, (provided, of course, there is no standard), then adjust the strength shown by the tests to this standard by direct proportion. Adjustments must be made for moisture by using the formula stated. This formula will be found to be correct on most goods, however, it is undoubtedly true that some grades of cotton will probably test slightly different from the figured result of this formula. For purposes of comparing the relative strength of several samples of the same goods, this small degree of error is of minor importance. The formula was based on the fact that for every one per cent of moisture regain there is about six and one-half per cent added strength, within the normal limits of moisture content.

It must be borne in mind, though, that the weight variable assumes that there is a normal moisture regain. By this is meant that the adjustment for weight should be made after the adjustment for moisture. Or, adjust for strength from the proportion of the bone dry weights.

To make the matter clearer an actual problem will be considered. Suppose we are to compare two samples of tire fabric. One sample weighs 17.60 ounces per square yard and contains 7.50 per cent of moisture regain; the other sample weighs 17.35 ounces per square yard and contains 6.50 per cent of moisture regain. The first sample tested normally 265 pounds warp-way and 275 pounds filling-way. The second sample tested normally 260 pounds warp-way and 270 pounds filling-way. The first sample had 1 per cent more moisture regain than the second and weighed in its bone dry state 16.37 ounces per square yard, as compared to a weight of 16.30 ounces per square yard of the second sample, or about 0.4 per cent heavier. We know that had the second sample the same moisture content it would break about 6.5 per cent higher, which would be 277 pounds warp-way and 287 pounds filling-way. Adding the 0.4 per cent weight to the second sample would add approximately another pound to both tests, clearly showing that the second sample though testing weaker was actually stronger than the first.

The determination of the weight per square yard of fabric from small samples requires the utmost care. The usual method pursued for this computation is to cut out a small square with a die. The proportion between this weight and the weight per square yard will be as the number of square inches in the cut sample, is to the number of square inches in a square yard. There is a tendency among the testers of heavy fabric to use a ten-inch square. This is drawn in the center line of the roll and cut out with scissors. It will be found more accurate in its results than the smaller samples, besides affording space for marking upon it information desirable for proper identification of the specimen. The writer has found it practicable and helpful to write the name of the manufacturer, his style number, the normal weight, and the bone dry weight on these ten-inch squares. After a number of samples for comparison are so marked, the moisture, regain, and weight per square yard can be recorded on the regular report sheet.

The preparation of samples for testing necessarily depends upon the method of testing. The usual method consists in breaking the number of ends in one inch. The warp and filling threads being tested independently. There is the well known Mullen's test which ruptures both warp and filling threads at the same moment by means of hydraulic pressure upon a rubber diaphragm across which is stretched the specimen. This test, however, cannot be used on fabric which is constructed with the view of strength being required in its use. For example, tire fabric has not been successfully tested in this manner, because the rubber diaphragm usually bursts with the fabric, making the test too expensive and irksome. This test is well adapted to knitted fabrics. (The writer believes that the Mullen's test or a similar test could be devised which places stress simultaneously upon the warp and filling threads and a very instructing result could be obtained. The manufacturer would then be enabled to know exactly how much force would be required to punch a given sized hole in the fabric.) The grab test is made by placing a large specimen in the jaws and biting into the fabric with jaws of a predetermined width and set a predetermined distance apart. The jaws are usually one inch wide and set one inch apart. The strip test first referred to is most generally used and is the most reliable test yet devised for fabrics built for strength. Figures 1 and 2 illustrate these two tests as they are made in a jaw stretching testing machine.

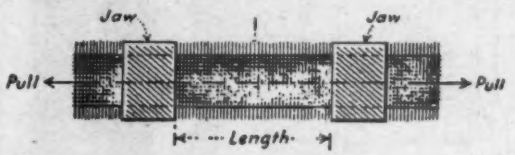


FIG. 1. THE STRIP TEST.

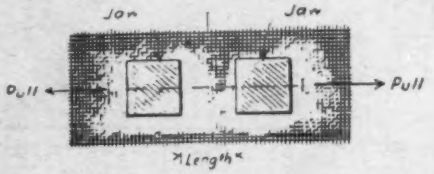


FIG. 2. THE GRAB TEST.

The strip test is begun by marking out the rectangular test strips near the center line of the roll of fabric. All tests regardless of whether for strength, crimp, or gauge should be made near the center of the roll, for near the selvage the fabric is slightly distorted and the tests are not

true indices of the condition of the material. The usual dimensions are 1½ inches by 7 inches. A line should be drawn down the center of each test strip for purposes of centering the strip in the jaws of the testing machine. Some testers prefer 2-inches width test strips—maintaining that this width ravelled down will have less distortion of the threads due to the ravelling process, than the 1½-inch width. However, if the strips are ravelled down to the number of ends in one inch as carefully as they should be, there should not be any difference in the tests, even though a 3-inch width were used. Certainly, the strips should have the location of the warp and filling threads the same as they were before the specimen was removed from the body

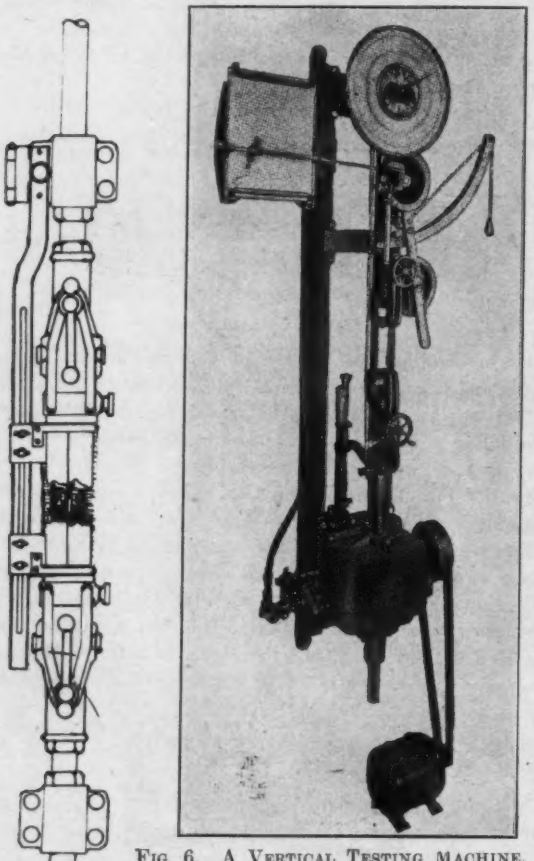


FIG. 6. A VERTICAL TESTING MACHINE.

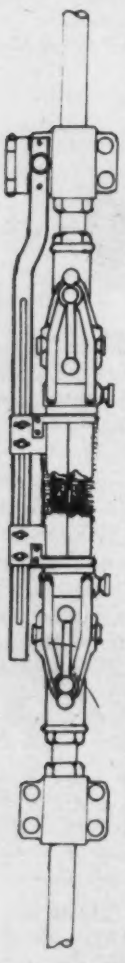


FIG. 3.

of the roll. If the tester thinks this can be accomplished better by the use of wide strips, he should use wide strips, but it is not advisable to use any narrower than 1½-inch strips. The point is to have enough length of thread protruding out from the ravelled piece to maintain the weave and prevent displacement of the individual threads. There should be about five tests warp-way and five filling-way from each roll.

After cutting the strips out, they are ravelled down to the number of threads in one inch as determined by counting the average picks and sley of the cloth. No attempt should be made to measure the width instead of counting the threads, unless the weave is close; 40x40, for example. Every strip should be carefully checked before testing to be sure it contains the proper number of ends. If each warp and filling thread has a tensile strength, alone, of, say, sixteen pounds, one may perceive the error resulting from a miscount of one thread.

Strength testing of fabric in a machine is much more complicated than it appears to the layman. The mere clamping of a test strip in the stretching jaws and throwing the machine in gear is by no means the whole story. While it is not intended to make this feature of testing seem difficult, or to require long experience, it is best to consider it as such, rather than to assume that anyone who can read the breaking weight from the dial, is capable of testing fabric.

The test piece must be placed accurately in the jaws so that its threads under tension are at right angles to the faces of the jaws. Also, the center line of the strip must

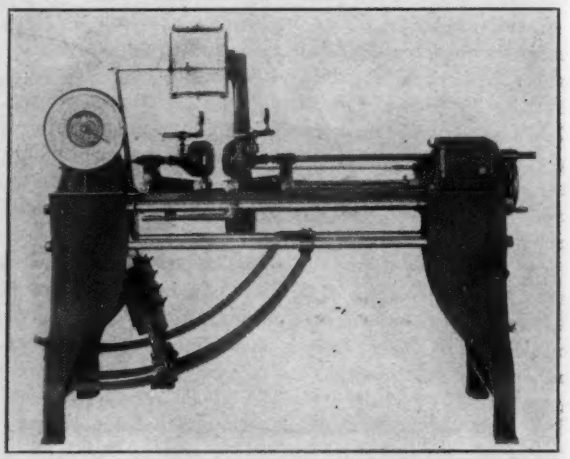


FIG. 4. HORIZONTAL TESTING MACHINE.

be within the center line of the jaws. The jaws must be clamped just tight enough to prevent slippage without shearing the fabric. Shearing is occurring when every rupture takes place at the edge of the jaws. Some ruptures occur at this point which are not necessarily cut in two by pressure. If there is frequent breakage at the jaw, though, it will be best to clamp the strips less tightly.

For centering the strips there are a number of methods and devices available. Some who are quite experienced in the art, do not desire any assistance in this operation and depend entirely upon the eye. However, if no mechanical device is used, it will be best to draw a line down the center of the strip and also paint with white enamel a thin, straight line on the face of both upper jaws, denoting the center. The strip can then be centered by placing the penciled line in the same plane with the lines on the jaw faces.

A centering device is illustrated by Figure 3 which was devised by the writer. It was found very helpful in centering the pieces, as well as increasing the rapidity of the tests. It will be observed that a glass is clamped to the moving jaw in such manner as to lie a fraction of an inch above the test strip. This glass has etched upon its face a straight line which is first placed in the center line of the jaws and just above the center line of the axis of pull. This location is found by measurement and the glass clamped in this position by means of the adjustable clamps. To center the strip with this device it is only necessary to place

the penciled line down the center of the strip, directly under the line on the glass. There is, of course, sufficient space between the glass and the strip to prevent any interference with the strip sliding between the jaws of the machine.

As was stated in reference to yarn testing, it is best to purchase the most up-to-date testing machinery to obtain reliable results. The power driven horizontal tester illustrated in Figure 4 is used in testing tire fabric and heavy duck. The recorder is a desirable attachment which draws a stress and strain curve of each test. Figure 5 shows the warp and filling curves of tests made on a piece of square woven tire fabric. It will be noted that the stretch is less and the strength greater in the filling than in the warp. The crimp is, of course, always less in the filling and hence the net stretch is less. The warp bearing the major portion of the strain of weaving, will have lost some of its strength and this is also affected by the greater amount of crimp. These charts are very helpful in comparing the results of various changes in the goods, due to manufacturing, and also serve as a machine made record of the tests.

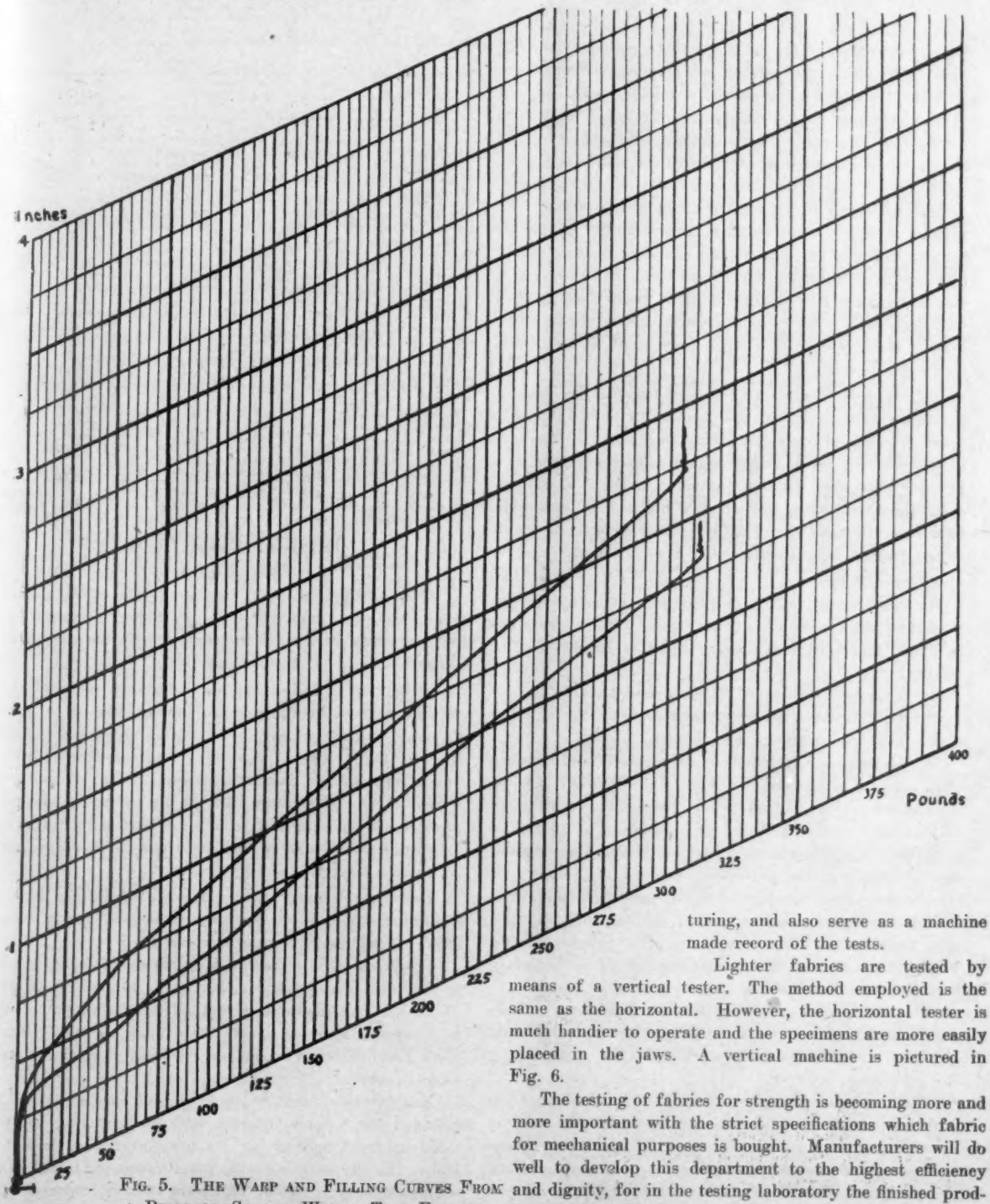


FIG. 5. THE WARP AND FILLING CURVES FROM A PIECE OF SQUARE WOVEN TIRE FABRIC.

Lighter fabrics are tested by means of a vertical tester. The method employed is the same as the horizontal. However, the horizontal tester is much handier to operate and the specimens are more easily placed in the jaws. A vertical machine is pictured in Fig. 6.

The testing of fabrics for strength is becoming more and more important with the strict specifications which fabric for mechanical purposes is bought. Manufacturers will do well to develop this department to the highest efficiency and dignity, for in the testing laboratory the finished product speaks for itself.

Determining Costs in a Cotton Mill

BY BENN KERSHAW.

In finding costs in a cotton mill it is first necessary to divide the various departments, also the various operations in each department, into what will be termed units, each unit to include only the machines which perform similar operations and through which the stock passes in practically the same manner.

Following this method, then all machinery which is directly connected to the picking will be considered as one unit. Coming to the carding we may class this as one unit, the drawing may be classed as another unit, combing as another unit and so on through the entire mill until we come to the weave room, where a different condition arises. In the operations previous to the weave room, the operation of each type of machine and the pay attached thereto are identical, but coming to the looms we find both plain and fancy work running and it would be hardly fair to consider the weaving as one unit because conditions are not the same on both types of looms; a loom fixer has more looms per section on plain work than he does on fancy work, a fancy loom requires more supplies than a plain loom; thus each kind of loom must be considered as a separate unit.

Different mills, according to their organization, will of course be found to vary in the make-up of their units, thus a list covering all cases can hardly be given. In this connection, it may be said that should any doubt exist in a person's mind when making up a list of units, as to whether a certain operation or portion of a mill should be classed as a separate unit, or put in with some other unit, by all means make that particular part a separate unit and so avoid confliction.

The first thing now to decide upon is the number of units and their composition, and after this has been determined, there are several other items to be obtained, as follows:

1. Floor space occupied by each separate unit.
2. Cost of floor space for each unit.
3. Cost of machinery in each unit.
4. Horsepower required to drive machinery in each unit.

The second item should include, besides the construction of that part of the building, the installation of all apparatus that may belong to that part of the building, such as heating, lighting, fire protection, humidifying, etc.

The third item, besides the cost of bare machinery, must include the cost of erection, cost of shafting and transmission, supplies for starting, and any other item which may belong to this unit, so that an accurate cost figure for manufacturing may be obtained.

The mill used as a means of illustration in this case will be a cloth mill of approximately 67,000 spindles, making both carded and combed work and selling the cloth in the grey state.

The accompanying table shows the units into which our mill is divided, also columns are provided for cost of floor space, amount occupied, cost of machinery where necessary; and also the horsepower needed to operate machinery where necessary.

In addition to the columns described there are also other columns provided which show what per cent each item bears to its own column. Thus the column headed "Floor Space" shows for office, 5,000 square feet occupied, while the total of the column is 281,311 square feet; then 5,000 ÷ 281,311 = 1.78 per cent of total floor space occupied by the office. This item will be found in the column next to the one marked floor space.

UNIT TABLE.

Unit	Floor Space	% of Total	Cost of Floor Space	% of Total	Cost of Machinery	% of Total	Hrse. Pow.	% of Total
Office ...	5,000	1.78	10,000.00	3.00	.....	.....	.....	.....
Picking	5,198	1.85	5,156.41	1.55	12,371.75	1.24	80	3.41
Carding	10,824	3.85	10,607.52	3.19	56,580.27	6.96	98	4.17
Combing	7,538	2.69	7,387.24	2.21	49,060.00	6.04	32	1.36
Drawing	2,328	.83	2,281.24	.68	7,288.50	.90	15	.64
Slubbing	1,600	.57	1,568.00	.47	5,111.52	.63	10	.43
1st Inter.	2,100	.75	2,058.00	.62	9,509.72	1.17	15	.64
2nd Inter.	4,284	1.52	4,198.32	1.26	31,211.52	3.84	50	2.13
Jacks ..	17,160	6.10	16,816.80	5.05	86,088.74	10.59	180	7.66
Warp Spinning	38,200	13.58	37,436.00	11.24	108,845.96	13.51	740	31.50
Filling ..	34,600	12.30	33,908.00	10.20	98,847.00	12.16	520	22.12
Spooling	5,200	1.85	5,096.00	1.53	4,923.00	.61	8	.34
Twisting	6,336	2.25	6,209.28	1.86	17,820.00	2.19	90	3.83
Warping	5,376	1.91	5,268.48	1.58	6,090.20	.75	5	.21
Slashing	4,158	1.48	4,074.84	1.22	4,870.00	.60	6	.25
Drawing-in	2,680	.95	2,626.40	.79	396.87	.05	.....	.....
Plain Weav'g	51,860	18.44	84,272.50	25.30	120,245.68	14.79	250	10.65
Fancy Weav'g	37,224	13.24	6,048.90	18.16	91,406.80	11.24	230	9.80
Cloth Room .	3,600	1.66	3,528.00	1.06	4,190.00	.52	10	.43
Machine Shop ..	2,585	.92	2,533.30	.76	5,000.00	.62	10	.43
Power ..	9,460	3.36	18,920.00	5.68	94,228.00	11.59	.....	.....
Storage	24,000	8.50	8,640.00	2.59	.....	.....	.....	.....
Total	281,311	100	333,075.53	100	814,085.53	100	2,349	100

(Note. The amounts in money in the above table are indicated by the correct placing of the decimal point, which in all cases is placed between dollars and cents, no dollar sign being used.)

Detail of Labor Costs.

Card Room.

After splitting the mill into its several units and attaching to each unit the items considered necessary, we are now ready to consider the reports from the various departments as to production and pay.

In making up these reports it is very essential that they be so constructed, that the person who is to figure the costs from them may be saved all unnecessary labor. In order that this may be so, every unit must be kept distinctly separate and each item attached to its own unit. It is also an essential factor that the person undertaking to produce an accurate cost basis must have a fair working knowledge of the mill, so that any changing condition may be analyzed quickly and accurately.

The accompanying table shows the card room lay-out and in order that the various divisions may be clearly understood a brief description is here given.

There are eight different hank rovings being produced at the jack frames, namely, 8, 10, 12, 14, 16, 18, 20 and 25 hank. This, however, is not all the divisions that are to be made, as some of the same hank roving is being made from different stock, also some of it is carded and some is combed.

Each division must be made so that only that hank is included that is made from the same stock, run through the same machines and having the same weight on each machine. In the table we will find fourteen different hank rovings shown, no two of which are running under exactly

the same conditions, regardless of the fact that in several instances the same number of hank roving is being produced at the jack frames.

WEIGHTS FOR CARD ROOM LAY-OUT.

Stock	Picker	Cards	Combers	Drawing	Slubbers	First Inter.	Second Inter.	Jacks
			Carded					
1⅛	12 oz.	50 gr.	...	60 gr.	.60 hk.	1.04 hk.	2.6 hk.	8 hk.
1¼	12 oz.	50 gr.	...	60 gr.	.60 hk.	1.35 hk.	3.5 hk.	10 hk.
			Combed					
1¼	12 oz.	50 gr.	55 gr.	60 gr.	.60 hk.	1.35 hk.	3.5 hk.	10 hk.
1¼	12 oz.	50 gr.	55 gr.	60 gr.	.60 hk.	1.35 hk.	3.5 hk.	12 hk.
1¼ E.	12 oz.	50 gr.	55 gr.	60 gr.	.60 hk.	1.35 hk.	3.5 hk.	10 hk.
1¼ E.	12 oz.	50 gr.	55 gr.	60 gr.	.60 hk.	1.65 hk.	4.95 hk.	14 hk.
1⅜	12 oz.	50 gr.	55 gr.	60 gr.	.60 hk.	1.65 hk.	4.95 hk.	14 hk.
1⅜	12 oz.	50 gr.	55 gr.	60 gr.	.60 hk.	1.65 hk.	4.95 hk.	16 hk.
1⅜	12 oz.	50 gr.	55 gr.	60 gr.	.60 hk.	1.65 hk.	5.25 hk.	18 hk.
1⅜	12 oz.	50 gr.	55 gr.	60 gr.	.60 hk.	1.65 hk.	5.25 hk.	20 hk.
1⅜ S.I.	12 oz.	50 gr.	55 gr.	60 gr.	.60 hk.	1.65 hk.	5.25 hk.	18 hk.
1½ S.I.	12 oz.	50 gr.	55 gr.	60 gr.	.60 hk.	1.65 hk.	5.25 hk.	20 hk.
1½ S.I.	10 oz.	40 gr.	50 gr.	55 gr.	.70 hk.	2 hk.	6.6 hk.	25 hk.
1 7/16 E....	10 oz.	40 gr.	50 gr.	55 gr.	.70 hk.	2 hk.	6.6 hk.	25 hk.

It must be kept firmly in mind that any production report sent in from the card room to be used for finding costs must have each hank roving listed separately, no two being combined for any reason whatsoever. In contrast to this it is not, however, necessary to make all these divisions when making out the pay roll, as all the 10 hank, for instance, may, when indicating the amount of pay, be grouped together if the piece work price is the same in each case.

A production report from the card room for one week, showing the production at the jack frames is shown herewith.

Referring to this production report and to the card room lay-out plan also given, the assembling of figures should be done in such a way as to show the production of any weight, or hank, on any unit in such order that the amount may be readily determined. In place of showing the production at that particular machine, however, the pounds produced at the jack frames will be given, because since there is no practical way of telling accurately the

CARD ROOM PRODUCTION REPORT.

Stock		Hank Roving	Pounds Produced
1⅛	Carded Work	8	3107
1¼	Carded Work	10	4092
1¼	Combed Work	10	2051
1¼	Combed Work	12	6295
1¼ E.	Combed Work	10	2547
1¼ E.	Combed Work	14	255
1⅜	Combed Work	14	1374
1⅜	Combed Work	16	2857
1⅜	Combed Work	18	1230
1⅜	Combed Work	20	235
1⅜ S.I.	Combed Work	18	1066
1½ S.I.	Combed Work	20	101
1½ S.I.	Combed Work	25	1494
1 7/16 E.	Combed Work	25	785

number of pounds any one machine in the card room may produce, the pounds actually produced at the jack frames will suffice.

A further reference to the lay-out plan will show the production in pounds on any weight, at any machine, in a manner very readily understood.

Thus the jack frames will be found to be producing 25,210 pounds of roving, which was run through the card as 50 grain sliver, while 2,279 pounds was produced when passed through the cards as 40 grain sliver. Mention is here made that these divisons will be used frequently later in this work.

CARD ROOM LAY-OUT PLAN.

Stock	1⅛	K 1¼	C 1¼	E 1¼'	1¼	E 1¼	1⅜	1⅜	1⅜	S. I. 1⅜	1⅜	S. I. 1½	S. I. 1½	E 1 7/16	Total
H. R.	8	10	10	10	12	14	14	16	18	18	20	20	25	25	
						Picker									
12 oz.	3107	4092	2051	2547	6295	255	1374	2857	1230	1066	235	101	.....	.....	25210
10 oz.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1494	785	2279
						Cards									
50 gr.	3107	4092	2051	2547	6295	255	1374	2857	1230	1066	235	101	.....	.....	25210
40 gr.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1494	785	2279
						Combers									
55 gr.	.....	.....	2051	2547	6295	255	1374	2857	1230	1066	235	101	.....	.....	18011
50 gr.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1494	785	2279
						Drawing									
60 gr.	3107	4092	2051	2547	6295	255	1374	2857	1230	1066	235	101	.....	.....	25210
55 gr.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1494	785	2279
						Slubbers									
.60 hk.	3107	4092	2051	2547	6295	255	1374	2857	1230	1066	235	101	.....	.....	25210
.70 hk.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1494	785	2279
						1st Interme diates									
1.04 hk.	3107	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3107
1.35 hk.	.....	4092	2051	2547	6295	.....	.....	.....	.....	.....	.....	.....	.....	.....	14985
1.65 hk.	.....	.....	.....	.....	.....	255	1374	2857	1230	1066	235	101	.....	.....	7118
2 hk.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1494	785	2279
						2nd Interme diates									
2.6 hk.	3107	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3107
3.5 hk.	.....	4092	2051	2547	6295	.....	.....	.....	.....	.....	.....	.....	.....	.....	14985
4.95 hk.	.....	.....	.....	.....	.....	255	1374	2857	.....	.....	.....	.....	.....	.....	4486
5.25 hk.	.....	.....	.....	.....	.....	.....	.....	.....	1230	1066	235	101	.....	.....	2632
6.6 hk.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1494	785	2279

Next comes the pay roll, which is divided into day work and piece work, in which the arrangement is so made that the total for any one unit may be very readily drawn off. Taking for instance the total general expense, this will be found to be 134.00, for picking the amount is 70.00, for carding 109.80, and so on. The arrangement of the sheet in this manner makes the information readily accessible and is of great assistance to the one who is in charge of the costs and who must obtain them from the pay roll.

CARD ROOM PAY ROLL.

	Day Work				Piece Work	
Position	Hrs.	Rate	Amt.	Total	Hank Roving	Amount
Overseer	48	.9583	45.00		.60	41.96
2nd Hand	48	.625	30.00		.70	4.46
Elevator Man	48	.375	18.00		1.04	3.66
Scrubber	48	.25	12.00		1.35	30.80
Sweeper	48	.25	12.00		1.65	18.74
Waste Man	48	.3541	17.00	134.00	2.00	7.24
Boss Picker	48	.4583	22.00		2.60	10.60
3 Picker Tenders	144	.3333	48.00	70.00	3.50	69.46
Boss Grinder	48	.62	29.76		4.95	35.26
Asst. Grinder	48	.4375	21.00		5.25	21.92
3 Card Strippers	144	.41	59.04	109.80	6.60	24.44
Doubler Tender	48	.3541	17.00		8.00	28.84
2 Ribbon Tenders	96	.3541	34.00		10.00	106.86
Boss Comber	48	.625	30.00		12.00	96.68
3rd Hand Combers	48	.4791	23.00		14.00	31.70
5 Comber Tenders	240	.4166	100.00	204.00	16.00	67.66
3 Drawing Tenders	144	.3437	49.50	49.50	18.00	64.48
3rd Hand Slubbers	48	.4588	22.00		20.00	12.04
2 Back Tenders, 1st Int.	96	.2906	28.00		25.00	106.60
3rd Hand Roving Frames	48	.4972	23.87			836.70
2 Roving Men	96	.3125	30.00			Total
2 Speeder Oilers	96	.3125	30.00	133.87		Piece Work
	Day Work Total			701.17		
	Total Pay Roll			1537.87		

It is now considered that enough information has been given to enable the labor costs to be easily determined at any unit in the card room. The term "labor cost" is so defined as to include all expense for labor which comes in direct contact with the product as it passes through the various manufacturing processes.

Cost Per Pound at Pickers.

Providing all cotton were passed through the pickers at practically the same rate of production, the labor cost per pound could be determined very readily by dividing the total labor costs on pickers by the pounds produced this amount being in all cases the pounds produced at the jack frames. In some cases, however, there is a different rate of production on the different kinds of cotton run, so that in a case of this kind it would not be correct to say that all cotton costs the same amount per pound for running. The cost in the picking department, however, is so slight, that only in exceptional cases would a separation be justifiable.

The mill which in this case has been used for an example is assumed to have a weekly theoretical production on the pickers, running 10-ounce laps, of 8,640 pounds, and on those running 12-ounce laps, of 10,260 pounds. A separation will be made in this work, in order that a case of this kind may be fully illustrated.

The labor cost on the pickers in this case is 70.00, and due to the separation being made it is necesary to divide this amount between the two different weights of lap being produced. Since the higher the rate of production, the lower the cost per pound, the reciprocal of the numbers showing the theoretical production must of course be used when finding the percentage which each one bears to the total.

By dividing 100 by each number representing the theoretical production, and then multiplying each result by the pounds produced on each weight of ounce lap used, the percentage which any one of these latter results bears to the sum of the results will show the labor cost to be charged against its production. This item will be more clearly seen in the following figures, which indicate the labor cost per pound on picking:

100 ÷ 8640 (10-ounce lap theoretical production) = .01157.

.01157 × 22,791 (pounds produced) = 26.36.

100 ÷ 10,260 (12-ounce lap theoretical production) = .00974.

.00974 × 25,210 (pounds produced) = 245.54.

26.36 + 245.54 = 271.90.

26.36 ÷ 271.90 = .097 or 9.7 per cent to be charged against 10-oz.

245.54 ÷ 271.90 = .903 or 90.3 per cent to be charged against 12-oz.

9.7 per cent of 70.00 (labor cost) = 6.79.

90.3 per cent of 70.00 (labor cost) = 63.21.

6.97 ÷ 2279 = .002979 cost per lb. against 10-oz. for picking.

63.21 ÷ 25,210 = .002507 cost per lb. against 12-oz. for picking.

Cost Per Pound on Cards.

As in picking, so also in carding, the theoretical production varies when running different stock, and this point should be carefully considered. The theoretical production will be used here in exactly the same manner as on the pickers, but in this case no explanation of the mathematical work will be given, as this was fully illustrated under the head of picking. The theoretical production on the cards for the different weights being produced is shown in the table on the next page.

CARDING COST TABLE.

	Theoretical Production		Pounds Produced		Per Cent	Total Cost	Proportional Cost	Pounds Produced	Cost Per Pound
100 ÷	256	= .391	× 1494	= 584.15	= .09	× 109.80	= 9.88	÷ 1494 =	.006613
100	378	.264	785	205.24	.032	109.80	3.51	785	.004471
100	500	.2	3107	621.40	.096	109.80	10.54	3107	.003392
100	450	.222	4092	908.42	.14	109.80	15.37	4092	.003756
100	470	.213	8346	1777.70	.275	109.80	30.20	8346	.003618
100	475	.21	2802	588.42	.091	109.80	9.99	2802	.003565
100	390	.256	5696	1458.28	.225	109.80	24.71	5696	.004338
100	365	.274	1066	292.08	.0451	109.80	4.95	1066	.004643
100	310	.322	101	32.52	.0051	109.80	.56	101	.005544

THEORETICAL PRODUCTION ON CARDS.

	Carded		Combed	Egyptian		Sea Island		Egyptian	Sea Is.
Grains	1⅛	1¼	1¼	1¼	1⅜	1⅜	1½	1⅞	1½
50	500	450	470	475	390	365	310	...	...
40	...	...	...	...	...	...	...	378	256

The pounds produced of each kind are taken from the card room lay-out plan previously shown, the figures in the Carding Cost Table, showing the cost per pound of each, are obtained in exactly the same manner as under picking.

Cost Per Pound on Combers.

The combing group is also worked out according to the theoretical production method, as no actual figures can be given to fit all cases, but in the mill, under actual conditions, the cost per pound may be found by dividing the total amount paid for combing by the pounds produced. For the reason outlined the theoretical production will be used here.

THEORETICAL PRODUCTION ON COMBERS.

Grains	Egyptian			Sea Is.	Sea Is.	Sea Is.	Egyptian
	1¼	1¼	1⅜	1⅜	1½	1½	1⅞
55	800	800	800	700	700	...	...
50	...	...	...	...	...	650	800

Turning back again to the card room lay-out plan, the pounds produced in each of the preceding groups, taking from the card room payroll the amount paid out for combing, the following figures are found for the combing cost table at the bottom of this page:

Cost Per Pound on Drawing Frames.

The cost per pound on drawing frames is so small that even though the work may be running some on two, and some on three, processes, we should hardly be justified in making a division here. The method used here will be to take the amount paid out for drawing and divide this by the pounds produced to obtain the cost per pound. The cost per pound is found and shown in the following manner: 49.50 ÷ 27,489 = .0018 cost per pound on drawing frames.

Cost Per Pound on Roving Frames.

At this point is met for the first time a condition which demands a division into two groups. First, operatives who are paid by piece work for operating machines according to the amount of work produced, and, second, operatives who come into contact with, or who are a necessary item in, the running of the machines and who are paid by the day, such as oilers, roving men, doffers, etc. Taking first the operatives on piece work, generally speaking each operative deals directly with a particular hank roving, and due to this it is a very simple matter to determine the cost per pound of each hank. In order to facilitate this work, it must be kept in mind that the production report must show the pounds produced on each hank, while the pay roll must show the amount paid for piece work on each hank.

Under this heading we shall first take up the .60-hank roving on the slubbers. The pay roll shows in this case a total of 41.96 paid for piece work, while the production report shows 25,210 pounds produced, so that 41.96 ÷ 25,210 = .001664 cost per pound of piece work on .60-hank slubber roving.

The roving frame cost table is made up by taking each hank roving on all roving frames and working it out as already outlined.

ROVING FRAME COST TABLE NO. 1.

Hank Roving	Amount on Pay Roll	Pounds Produced	Cost Per Pound
.60	41.96	25,210	.001664
.70	4.46	2,279	.001957
1.04	3.66	3,107	.001177
1.35	30.80	14,985	.002060
1.65	18.74	7,118	.002632
2.00	7.24	2,279	.003176
2.60	10.60	3,107	.003411
3.50	69.46	14,985	.004695
4.95	35.26	4,486	.007860
5.25	21.92	2,632	.008328
6.60	24.44	2,279	.010724
8.00	28.84	3,107	.009282
10.00	106.86	8,690	.012296
12.00	96.68	6,295	.015358
14.00	31.70	1,629	.018735
16.00	67.66	2,857	.023682
18.00	64.48	2,296	.028083
20.00	12.04	336	.035833
25.00	106.60	2,279	.046818

Distributing Day Labor on Roving Frames.

There are three general methods used when dividing the day labor on the roving frames. First, according to the number of spindles, or frames, running on each hank, this hank being the hank roving produced on the final roving process; second, according to the production on each hank; and third, according to the cost of total piece work for each hank on the roving frames.

There are none of these methods which will fit to perfection all cases of day labor, take, for instance, the oilers and doffers. The number of oilers depends upon the amount of frames or spindles being run, so that the cost of this labor can be correctly distributed on this basis. Not so in the case of the doffers, however, since a frame on a finer hank does not require so much of a doffer's time as a frame on coarse work does, so that the cost of this type of labor would be more correctly distributed if based on

COMBING COST TABLE.

	Theoretical Production		Pounds Produced		Per Cent	Total Cost	Proportional Cost	Pounds Produced	Cost Per Pound
100 ÷	650	= .154	× 1494	= 230.08	= .0884	× 204.00	= 18.03	÷ 1494 =	.012068
100	800	.125	785	98.13					
100	800	.125	8346	1043.25	= .8474	204.00	172.87	17629	.009806
100	800	.125	2802	350.25					
100	800	.125	5696	712.00					
100	700	.143	1066	152.44	= .0642	204.00	13.10	1167	.011225
100	700	.143	101	14.44					

the number of pounds produced.

If a different method were to be used in each of these cases, it would involve an unnecessary amount of labor which would in no case be justified by the results obtained, the variation in any of these methods being so slight. It remains therefore to select the method best suited to varying conditions. After considering all conditions to be met, it has been decided that there is no better single method of distribution than the cost method. If the total pounds produced of each hank on the jack frames is multiplied by the total piece work cost per pound on all roving frames on that hank, then these results used as a percentage basis on which to distribute the day labor cost, both the number of spindles and the pounds produced will influence the result, as the spindles it takes to produce a given number of pounds in a given time governs the piece work cost per pound. The pounds produced being directly used.

Much labor may be saved if instead of finding the total piece work cost of each hank, we find the per cent which the cost of the day's work bears to the piece work cost, then add this per cent to the piece work cost per pound on each hank.

In compiling the cost per pound, proceed as follows: First find the total cost per pound for all piece work on all roving frames, for each separate hank roving being produced on the jack frames. The following table shows the piece work cost per pound on each hank on each machine, and the total cost per pound of each hank roving produced on the jack frames.

ROVING FRAME COST—TABLE NO. 2.

Machine	8 Hk.	10 Hk.	12 Hk.	14 Hk.	16 Hk	18 Hk.	20 Hk.	25 Hk.
Slubber	.001664	.001664	.001664	.001664	.001664	.001664	.001664	.001957
1st Intermediate	.001177	.002060	.002060	.002632	.002632	.002632	.002632	.003176
2nd Intermediate	.003411	.004695	.004695	.007860	.007860	.008328	.008328	.010724
Jack Frame	.009282	.012296	.015358	.018735	.023682	.028083	.035833	.046818
Totals	.015534	.020715	.023777	.030891	.035838	.040707	.048457	.062675

The cost of day work on roving frames, as shown by the pay roll, is 133.87. The total cost of piece work is shown as 836.70. By dividing the day pay by the piece work pay, the percentage which must be added for day pay to the cost per pound of piece work on each hank is found.

133.87 ÷ 836.70 = .1599 or 16 per cent.

As a means of illustration, take for instance the 8-hank roving; the total piece work on roving frames for this hank is .015534 and 16 per cent of this is .002485 which, when added to .015534, gives .018019 as the total cost per pound of all work produced on the roving frames. If each hank produced on the jack frames is treated in this manner roving frame cost table number three will be obtained.

ROVING FRAME COST TABLE NO. 3.

Machine	8 Hk.	10 Hk.	12 Hk.	14 Hk.	16 Hk.	18 Hk.	20 Hk.	25 Hk.
Piece Work Per Lb.	.015534	.020715	.023777	.030891	.035838	.040707	.048457	.062675
+ 16 per cent	.002485	.003314	.003804	.002162	.005734	.006513	.007753	.010028
Total Cost Per Lb. on Roving Frames.	.018019	.024029	.027581	.033053	.041572	.047129	.056210	.072703

There now remains to be distributed the general expense for the whole room, such as the pay for the overseer, second hand, etc. It has been shown by the pay roll, that this is best done on the percentage basis which is obtained by dividing this amount by the total of all other costs. This being the same method as the one used for the distribution of day labor on the roving frames. As the cost of the whole room is now being used, there must be as many divisions of hank rovings as are required by the different costs on the various machines.

The total pay roll shows the amount paid out in the card room to be 1537.87. Of this, 134.00 goes for general expense to be distributed. Thus 1537.87 — 134.00 = 1403.87, is the amount of pay already distributed. Now dividing 134.00 by 1403.87 gives the per cent to be added to the cost per pound, so far obtained, of the different hanks.

134.00 ÷ 1403.87 = .09545 or 9.54 per cent.

Roving frame cost table number four shows the costs in the card room to which the 9.54 per cent just found has been added.

ROVING FRAME COST—TABLE NO. 4.

Staple	1½	1¼	1¼	1¼E	1½	1¼E	1⅝
Hank Roving	8 Hk.	10 Hk.	10 Hk.	10 Hk.	12 Hk.	14 Hk.	14 Hk.
Machine							
Pickers	.002507	.002507	.002507	.002507	.002507	.002507	.002507
Cards	.003392	.003756	.003618	.003565	.003618	.003565	.004338
Combers	.....	.....	.009806	.009806	.009806	.009806	.009806
Drawing	.0018	.0018	.0018	.0018	.0018	.0018	.0018
Roving	.018019	.024029	.024029	.024029	.027851	.033053	.033053
Total	.025718	.032092	.041760	.041707	.045312	.050731	.051504
9.54 Per Cent	.002453	.003062	.003984	.003978	.004321	.004839	.004913
Total Cost Per Lb. in Card Rm.	.028171	.035154	.045744	.045685	.049633	.055570	.056417

ROVING FRAME COST—TABLE NO. 4 (Continued).

Staple	1⅝	1⅝	1⅝ S.I.	1⅝	1½ S.I.	1½ S.I.	1 7/16E
Hank Roving	16 Hk.	18 Hk.	18 Hk.	20 Hk.	20 Hk.	25 Hk.	25 Hk.
Machine							
Pickers	.002507	.002507	.002507	.002507	.002507	.002979	.002979
Cards	.004338	.004338	.004643	.004338	.005544	.006613	.004471
Combers	.009806	.009806	.011225	.009806	.011225	.012068	.009806
Drawing	.0018	.0018	.0018	.0018	.0018	.0018	.0018
Roving	.041572	.047129	.047129	.056210	.056210	.072703	.072703
Total	.060023	.065571	.067295	.074661	.077286	.096163	.091759
9.54 Per Cent	.005726	.006255	.006420	.007122	.007373	.009174	.008753
Total Cost Per Lb. in Card Rm.	.065749	.071826	.073715	.081783	.084659	.105337	.100512

[NOTE: Providing the 8-hank roving had been run three processes, instead of four, the method used would have applied equally well. In case any of the roving frame tenders are not paid by piece work, then the cost per pound on these frames may be obtained by the method which will be described under the head of the spinning room.]

[This is the first of a series of articles on mill cost keeping by Mr. Kershaw. Others will follow in early issues.]

National Erie Brown 3GN is a direct dye recently developed by the National Aniline & Chemical Co. It is recommended for cotton yarn, artificial silk yarn, cotton piece goods and other uses. National Erie Black RX is a black of a bright reddish cast, which can be used in all types of machines. It dyes cotton slightly heavier than wool in a neutral bath, which is of value in union dyeing. Silk and cotton are dyed uniformly, which is of interest to the hosiery dyer.

The Barrett Company has issued a 28-page booklet descriptive of the new Holt roof leader and vent connections. These connections are designed for use with either kind of flat roof or saw-tooth construction, and are adaptable for any place where vent pipes, leader lines, steam stacks or flag poles are installed; in fact, for any fixtures passing through the roof which require flashings. The booklet briefly describes and illustrates the eight types of Holt roof connections, showing half-tone illustrations together with a cross-section view of each type.

Dimensions for piping equipment are given in a booklet recently issued by the National Valve & Manufacturing Co., Pittsburgh, Pa., as Catalog No. 5. In this booklet the arrangement of the dimension sheets closely follows the recognized classification of the valves, fittings and flanges in regard to pressures and temperatures.

Talking to the Operatives

BY A VISITOR.

The other day I came across a most original and valuable idea that I believe can be adopted by a large number of superintendents and managers with benefit and profit. I walked into a superintendent's office and found the "super" and his son busily engaged in operating a mimeograph machine. "I've gone into the publishing business now," was his greeting, answering my unspoken question. "What's all this?," I asked, immediately interested, and settled down for a good little story.

"About five months ago," replied the superintendent, "I felt a need for some means whereby I could talk to my operatives, and get closer to them and create a better feeling of responsibility and interest between the help and the management. I conceived the idea of getting out a little weekly letter and tried to make it newsy for them and also put in a number of suggestions. I got this multigraphed by a local concern and distributed copies among all the operatives. In the letter I talked just as if I were talking to one individual worker, and mentioned little things of a personal interest to all of them, such as keeping the mill clean, a play that the young folks were going to put on, several meetings that were going to be held in the village, and so on.

"Well, sir, the thing went over big. I certainly was glad to see that the operatives enjoyed and appreciated the little personal message, and after getting out two or three more letters, one a week, I found that nothing would do but that it should be made a regular proposition, and so I bought this mimeograph machine and get one of these letters out every week. It's gotten so that the help are looking forward to each Wednesday, when the letter goes out, and the interest they are taking in it and the effect that some of my suggestions have had in the mill have made me feel that it is one of the best things I've ever done along this line."

We started folding the letters to get them in shape for distribution, and in a few minutes, as if in corroboration of the superintendent's remarks as to the interest the help were manifesting in the letter, a woman came in and asked "Are you going to get the letter out this week?" (It was Wednesday afternoon and she had been accustomed to getting it in the morning.) On being told that was what we were doing, she said, "Well, please be sure to save me a copy; I wouldn't want to miss one for anything."

She had no sooner gone back into the mill when one boy, and then a man, followed her with similar requests. By this time I was beginning to realize what the superintendent was doing, and then, after we'd gotten them all fixed up, we started through the mill to deliver bunches of them to the different overseers to give out to the help. As we were passing the warpers, two girls stopped us and wouldn't be satisfied until we gave them copies of the letter. Then we went on to the desk of the overseer of spinning and just about the time we got there a man caught up with us and asked for a copy of it. He had followed us all the way across the spinning room.

And so it went all through the mill. Everywhere we went the workers seemed eager and anxious to get a copy of "the superintendent's letter." Why, I was told that about a month before, one of the women who was leaving the mill for about a month wouldn't be satisfied until the superintendent had promised her to save her a copy of each letter he got out while she was gone. She said she was making a book of them, and didn't want to miss a single one.

"Jimmy!," I remarked to the superintendent when we got back to the office. "I know some magazines that would give almost anything for the 'reader-interest' you've worked up for that little letter."

Then it occurred to me that if this man is getting such good returns out of the effort and time he's putting in on this thing, there ought to be a raft of other superintendents who might apply the idea in their mills, if it was brought to their attention. He kindly loaned me a copy of each of the eighteen letters he had gotten out up to that time. They're great stuff, and the following paragraphs from some of them give a little idea as to the way this superintendent talks to his help every week. Naturally, what this man says to his people might not be directly applicable or interesting elsewhere, but the idea is there, showing how he gets right down and talks to the mill people in a way they will read and understand.

In one of his letters he asked the question of the help, "Did you ever think why some people moved so often?," and then gave the reasons why two families had recently left his village. One of these was because "father found someone with whom he would rather loaf than those with whom he had loafed here." Then the superintendent took the opportunity to preach a little sermon on moving around and such.

Another time he took occasion to urge the mill people to be kind and pleasant to new-comers in the village. "Do you remember how you felt when you first moved here and the first day you went to work in the mill?," he asked. "Our newcomers feel the same way as you did, so let's make it more pleasant for them by welcoming them here." Another time he cautioned the folks about letting their chickens run astray and tearing up the other fellow's garden, and then while talking on gardens he gave some good advice as to planting and caring for the plants. When efforts were being made to organize a young ladies' club in the village, he mentioned the fact in his letter and pointed out its advantages, offering to furnish the place to hold the meetings if someone would start the movement. The club was organized and from week to week he tells of its activities. That instance is used only as an illustration; there are scores of others.

In almost every letter he puts in a helpful little inspirational poem for the help. Then next maybe he'll announce the wedding of some of his workers, or get off a joke on some of the men, or announce a meeting, or call attention to something that is not exactly right. In one letter he had this to say:

"Would I be wrong in saying someone should look after our church room a little more so than is being done? Have you noticed how dirty the electric lamps are? And

how much better it would look if the windows were clean and the shades all pulled the same? If some one will volunteer to look after the job, I will furnish the help to put the room in good shape. Come on, church ladies, and let's clean up." And, of course, the church was cleaned up. Or—

"What would I be doing if those who have money enough to operate manufacturing establishments or other places of business did not give me employment? Have you ever given this question a thought? If you have not, then think it over. My answer to the question would be, starving to death. Someone must give me employment; therefore I am thankful for those who are in a position to give me this employment. How about you?"

There are a thousand and one things for a superintendent to talk to his help about, and this man's way of doing this struck me as a very convenient and inexpensive one. The superintendent in question got a mimeograph for a very reasonable amount, secured a supply of stencils and has the letters run off in his office, and that's all there is to it. His letter is printed on a four-page folder made out of a single sheet of paper 14 by 8½ inches in size, making the letter, when folded, measure 8½ by 7 inches. The name of the letter appears at the top of the first page, and is made by using the asterisk or other symbols on the typewriter, as every stenographer learned to do while in school. This superintendent adds a further personal touch to the letter by signing his name with a stylus provided with the machine.

If you have something you'd like to tell your operatives, Mr. Superintendent, why not try this plan or a similar one? It affords a means of "getting across" to the workers the ideas of the management and of creating a closer personal relationship between the superintendent and the people who work in the mill. It doesn't take much time or effort, in comparison to the results secured, and as your people are just like those in the mill in question, you will undoubtedly find that they will welcome and appreciate an action of this sort on the part of the management.

Gain or Loss of Weight in Dyeing and Bleaching Cotton.

Loss of weight in dyeing is due, in the first place, to the removal of the impurities of the raw material; and, secondly, to the degumming action of the assistants added to the mordant and dye baths.

The impurities referred to are not the dirt and dust which should be removed if the preparation for spinning is properly carried out, but are in the fiber itself without being an integral part of it. Cotton fiber in the natural state contains five per cent of waxy and resinous matters which impregnate it and in a measure, adhere to it. These are the pectic matters which are found in most vegetable substances, and far from being of an objectionable nature, they give the fiber flexibility and elasticity. They are hardly soluble in cold water; their presence prevents the cold bath from penetrating to the interior of the fiber. On the other hand, the prolonged action of boiling water softens or melts them; they either form an emulsion or are dissolved. Still, the use of hot water in wetting-out cotton takes too long a time to be practicable, and therefore alkalies are used. These easily and rapidly remove the pectic matters, and allow the water to penetrate the fiber.

It is a general rule in dyeing to wet-out the fiber completely before introduction into the dyebath, and in this way to insure uniformity of absorption and penetration. This is specially necessary when dyestuffs or chemicals are used which are very rapidly absorbed. On the other hand, when a long process of dyeing at the boil is necessary the material may be entered into the bath without wetting-out as the gradual action of the boiling bath allows the coloring matter to penetrate sufficiently, and level dyeing is obtained.

It is evident therefore that the loss of weight of the cotton fiber in dyeing may be considerable, owing to the elimination of the waxy and resinous matter, more or less complete according to the effectiveness of the preliminary boiling out. If this has been done with caustic soda under pressure in the closed kier the loss may be five per cent, but if the material has been wet-out with a weak solution of Turkey red oil in the open vat at a moderate heat the loss may not be more than three per cent.

On the other hand, the cotton gains a little weight by the absorption of the mordant or dyestuff, varying according to the depth of shade and the nature of the coloring matter. For the direct cotton colors in deep shades it is necessary to deduct two to three per cent of the loss. Under these conditions, if the cotton has been thoroughly boiled out, the five per cent loss will be brought down to two to three per cent. If it has simply been wet-out, the loss will be brought down to one per cent after absorption of the coloring matter. It may be, in fact, that there is no loss at all, or, on the other hand, if a very light shade is obtained with a direct cotton color, the deduction for the amount of color absorbed may represent not more than a tenth, or less, per cent.

As regards the basic colors mordanted with tannin and fixed with tartar emetic, the mordant, reagent, and coloring matter all increase the weight, from which must be deducted the loss in boiling out. For instance, if the cotton is wet-out with Turkey red oil so that there is not more than a loss of three per cent, the tannin will restore two per cent, and the tartar emetic another one-half per cent, and, say, if Methylene Blue is the dyestuff, this will account for another two per cent increase, with the consequence that there is a final gain of one and one-half per cent.

With sulphur black the final gain of weight may be two to four per cent. With the mordant colors, such as logwood black, Turkey red, or the other alizarines, sometimes the increase of weight may reach eight per cent, owing to the large quantity of mordant absorbed by the fiber.

In bleaching the boiling, energetic washing, and treatment with chloride of lime and acids eliminate not only the waxy and resinous substances, but also a part of the mineral matters which enter into the constitution of the fiber. Thoroughly bleached cotton is therefore almost chemically pure cellulose. The matters thus removed represent a loss of about six per cent, from which must be deducted a slight increase, due to the addition of softeners, which may be estimated at about one per cent. The final loss may thus be about five per cent.—*L'Industrie Textile.*

The Foundation of Organization

BY R. A. SONIAMAN.

As the skeleton is to the body so is organization to industry. Without it there could be no progress as progress is understood in these modern times.

Before the world war, organization was receiving the attention of efficiency experts and scientific management men. When, however, the war broke out and as the world called upon us, more and more, to provide the things it was unable to make in sufficient quantities, organization, as a scientifically constructed affair, suffered something that Burns aptly expressed by, "The best laid schemes o' mice an' men gang aft a-gley."

Today, when the spectacle of the tottering industrial structure is a most painful one, when the large number of unemployed workers is calling forth national notice, when the fear is rampant of our great country being converted in a dumping ground for cheap European products, organization must, and undoubtedly will, again command an increasing amount of consideration.

Manufacturing organization only is meant here. In the majority of textile concerns this organization is perhaps a comparatively simple system, following closely the well-known military one. It is like a pyramid. At its head

is the superintendent, and then follow the overseers, the second hands, the section-hands, the forewomen, instructors, and finally, the great body of workers.

Believing that the war has brought home clearly that the workers are the most important part in any organization—the foundation, in fact, see sketch—it may be advisable to limit the discussion to that part only.

It will, therefore, be taken for granted that the managerial end—the steering, guiding, or leading apparatus, so to say—has been well taken care of by the concern. That is: the superintendent and overseers are capable and efficient men, skilled in the intricacies of the manufacturing processes and at the same time adept in the handling of workers; that the second hands are men who are thoroughly familiar with the work in their particular rooms, and are of good enough material to promote into overseerships; and that the section hands contain enough young men in their ranks so that there will be no necessity for going outside the plant for second hands.

Furthermore, it will be assumed that there is a clear cut system of teaching the section hands their duties, and that some scope is allowed for the development of their reasoning and initiative powers.

Without doubt, no person conversant with conditions as they actually were during the world war will gainsay the foregoing statement that the biggest factor in organization are the workers. No person, furthermore, would deny that the workers did not understand this fact very thoroughly; nor that they did not fully realize that upon them, and them alone, did production depend.

Now, then, how did the workers conduct themselves during the trying times of the war?

Were they always instantly susceptible to the guiding influence of the directing parts of the organization? Hardly! There was, frankly speaking, scarcely any guidance, any management of the workers possible. It was simply a case of drifting, drifting along under the wind generated by the stress of greater production; everybody drifting pretty much as they pleased, caring neither where they went nor how they got there.

If an overseer became worried about the poor quality of a hitherto excellent product, and spoke to Maggie Santi about her bad work, up would go Maggie's penciled and denuded eyebrows, and she would snort indignantly:

"Well, if m' work ain't all right, give me m' bill."

Or, Maggie's white-washed powder-camouflaged face would turn toward a highly interested fellow worker and wrinkle into a contemptuously sneering grin that was even more exasperating than a flippant answer.

It was a daily occurrence to see workers doing things in a way that was detrimental to the product, even after they had been repeatedly shown that they were damaging the goods. Furthermore, the only recourse one had was to let them go it, trusting that eventually they would see the error of their ways and correct them! or one had the alternative of discharging them and doing the work oneself. However, not being ubiquitous like the sparrow, nor able to do all things oneself, the latter course was out of the question.

It must be noted in connection with this discussion of organization that a large contributing factor in the poor quality and the low production was the turnover of help. Instead of the foundation being a solid, dependable structure, it was as if made of quicksand. Indeed, so rapid was the change in workers that it was well nigh an impossibility to teach them properly; and this even where instructorships were purposely created with experienced workers to train the learners.

Devices of all kinds were originated for keeping the labor turnover down to the lowest minimum possible—recreation buildings, athletic grounds and associations, cooperative societies, and bonus systems of every conceivable variety. Increases in wages were given often and voluntarily to hold the workers.

And did the increases of wages result in a corresponding betterment of the product? Did it even result in a production equal, commensurate to a similar former increase in wages? No! There was no general correspond-

ing excitation of efficiency. Rather the opposite! For work was so easy to obtain that workers did not hesitate a moment to quit a job that they could handle efficiently for one that they knew nothing about, but which paid a high wage for learning and gave promise for bigger returns later. And the result was that, in general, an inferior grade of goods and a lower quantity was turned out. So prevalent, indeed, was this floating of workers and so universally was it pressed home to thinking minds that the government finally, through its Labor Bureau, instigated investigations to definitely establish the underlying causes and to suggest or devise remedies for the same.

Discipline—the cement of organization—became a lost art. It irked, chafed, irritated—and anyway, what was the use! If a half-finished article could command several times more money than a perfectly finished article in normal times—why in goodness name, worry? And so the vicious circle continued.

Now, however, in the present period of depression, in the present moment when everything has been or is being deflated, when workers who left their old jobs hurriedly in the mad scramble for bigger wages realize that to every action there must be an equal reaction, what is to be done?

Simply build up the foundation of organization so that the hard competitive years ahead can be bridged safely. An illustration from farming may elucidate the method of procedure.

When cultivating a garden you find that weeds will soon creep in among your select stock. Do you then let them stay, and multiply, and finally crowd out and spoil your vegetables or flowers? "Not on your life" you explode. You get right down on your knees, if you never do otherwise, and you yank up the obnoxious growths by the roots. You find that this is extremely efficacious, don't you? Then why in the name of common sense can it not be applied to the industrial garden where the effects of rank growths is certainly as detrimental to the crop—the production—as the weeds in an agricultural garden.

To sort out, then, and retain from the conglomeration of the peoples that came into the textile world during the war, those whose capabilities, attendance, and past conduct are most favorable to a company's immediate future welfare is the paramount duty of all up-to-the-minute management.

Inefficient, trouble-making, losing workers, like the weeds in the garden, must be inexorably expelled.

This will not be as easy as it reads; for it is a well recognized principle of psychology that the frail human memory breaks down after a certain length of time in regard to past experiences. For instance, during any war the experiences of the soldiers are of a very depressing character; yet after the lapse of a few years, the soldiers lose all memory of the bad experiences, and relate only the pleasing parts.

It is the same with persons whose early life was filled with poverty, but who later came into affluence. Their recollections of their early indigent existence is extremely hazy. As a matter of fact, psychologically speaking, bad memories tend to fade, good ones tend to remain.

Bringing this psychological knowledge to bear on our organization problem, it is easy to discern a logical connection between the lapses of memory in regard to good and bad performance of workers. We remember that such and such a person has always been a first-class worker, diligent, quiet, and efficient. On the other hand, in connection with those workers with whom we had so much trouble, the ones who stayed away from their duties without excuse, who lied when they were questioned about it, who spent a good deal of their time gadding with a neighboring worker although repeatedly admonished not to, who flared up, threatened to get through, and then deliberately continued to make bad work after having been spoken to about the particular bad work—there is a natural tendency for these memories to slip from the mind, like water from a duck's back. Particularly so, if circumstances compel these workers to be on their good behavior during the meantime.

No doubt, the ability to forget unpleasant experiences is a dispensation of an all-wise Creator, but unfortunately in business such a forgetful attitude on the part of the men responsible for the management of a concern is simply a case of leaving the weeds dormant until an upward trend in business causes them to flourish as evilly as before.

In other words, for the management to forget the incompetent, unwilling, mean workers, now that adverse conditions are acting like a club to hold them to their jobs is to be derelict in its duty to the concern. In every depression, where the supply of workers is greater than the demand, it is well to eliminate those workers whose past actions have shown conclusively that they have been, and probably will be again, a detriment to the best interests of the company.

This statement is not intended as a literal carrying out of the biblical injunction of "an eye for an eye, a tooth for a tooth;" it is not intended that an opportunity to "get square" has come, and must be taken advantage of. No, the statement is made from the standpoint of efficiency solely, and for the benefit of employees as well as employer.

The survival of the fittest phrase is known to all, and the elements that made that phrase possible are still at work today. It is true that the great war caused a momentary break in the working of this law, but inexorable nature is swinging the scales back again.

What is actually proposed, then, is that when a worker has been known to have given trouble in the past, either by his negligence to appear promptly and regularly at his work, his unwillingness to attend his work as directed, his saucy replies when spoken to in connection with his work, or his bad work—when such a worker can be replaced by one fully as capable and whose record is good, then replace the worker.

Sentiment is a fine thing, and too much of the right kind is never dispensed under the best of conditions in the industrial system of today, but that can be only maudlin sentiment which will keep a known bad worker at his job while a better person is out of employment.

The attitude of the workers also should be taken into consideration when building up a first class organization. Have they in the past displayed antagonism to the firm? Have they done overt acts or uttered unwarranted uncomplementary or inflammatory remarks?

By the way, antagonism here does not mean the little ill-feeling that always pervades a worker's heart when he compares his portion in life with that of those placed over him. Absolutely not! No human being is alive today who,

serving in a menial capacity, does not envy the supposed better advantages enjoyed by his superiors or employer. This is a natural feeling and must always be reckoned with.

Enough has been said to serve as a guide. Every mill will no doubt have its own way of carrying out the foregoing suggestion. The great point is to do it now, so that there will be a true industrial preparedness for whatever business storms there may be still ahead of us.

Indigo

BY WILLIAM B. NANSON.

Discharges on Indigo by Reduction.

The use of formaldehyde-sulphoxylate for discharging white patterns on material dyed with indigo and other vat colors is the most recent and the most notable advance in the printing industry brought about by the use of hydrosulphites. It has long been known, and use has been made of the fact, that oxidizing agents would destroy indigo blue and render it colorless, and all the discharge printing on indigo has been based upon this. The great disadvantage has been, however, that these agents also acted upon the cotton fiber and the formation of oxycellulose with material loss of strength has occurred. By the use of reducing agents this could be avoided but the difficulty was to remove the indigo white produced on the pattern before it became re-oxidized. Various methods have been tried to remedy this but without any practical result until it was discovered that certain bases of the substituted ammonium type would combine with indigo white to form stable compounds which do not oxidize in the air. Further experiments proved that this property was characteristic of compounds of certain tertiary bases with benzyl chloride, its homologues and analagous bodies and their substitution products.

But in order to obtain white discharges the compounds obtained in the discharge process had to be made readily soluble. It was found that this could be done by the substitution of a sulphuric group in the benzyl nucleus. The yellow compound obtained by using a substance of this nature in the formaldehyde-sulphoxylate discharge paste is readily soluble in alkalis and being easily removed from the material leaves the pattern clear.

Thus the problem of satisfactory indigo discharge was solved. The discharge material is not sold as such, but in combination with sodium formaldehyde sulphoxylate as Hydrosulphite CL or Rongalite CL, according to the maker.

The practical method of handling is simple. The discharge pastes are made up with 20 per cent of the sulphoxylate discharge compound, 8 per cent zinc oxide, 4 per cent anthraquinone, 30 per cent color paste, with suitable thickening. The material is printed, dried, steamed for 3 to 5 minutes at 212 to 220 degrees F., washed in hot water, then passed through an alkaline bath, washed and dried.

In this process, the pastes are perfectly stable and after printing and steaming the material can be left indefinitely before clearing if necessary. This process has been adopted by the largest calico printers in England and in spite of the fact of its higher cost the products of this method now represent the standard of indigo prints. The success or failure of both the printing and discharges depends mainly upon the proper construction and condition of the steamer. This must be arranged so that all excess of air is excluded and suitable steam plates provided for heating so that the interior can at all times be kept at a temperature of 212 to 220 degrees F. (See illustration, Part 3, June COTTON.)

This improved reduction process of discharging indigo blue is known as the Leukotrope process, and is briefly as follows: When compounds of benzyl chloride with dimethylaniline, methylaniline, methylphenyaniline, dimethylmetamidophenol, etc., are brought into contact, in presence of zinc oxide, with indigo white, first produced on the fiber by the hydrosulphite discharge, they form reddish yellow dyestuffs, which being fast to acids, alkali, and soap, are suitable for the production of permanent and fast yellow discharge effects in indigo dyed cloth. Leukotrope O (B.A.S.F.) is a member of this class and the yellow discharge is made as follows:

YELLOW DISCHARGE.

460 parts British gum thickening
200 parts Rongalite C
Dissolve, cool off, and add
100 parts Leukotrope O and
40 parts anthraquinone paste 30 per cent.

This, when printed upon an indigo dyed cloth, produces a dark blue fabric with a reddish yellow pattern on it.

On the other hand, if the benzyl radicle in the foregoing compound is replaced by a benzyl chloride with a sulphonic group substituted in the nucleus, a second series of Leukotropes is obtained; and these bodies—of which Leukotrope W is one—also combine with indigo white to form yellow dyestuffs which, while unaffected by air and moisture, are very soluble in alkalis, and are, therefore, well suited to the production of white discharges on indigo. The stability in either moist or dry air of both the soluble and insoluble yellow derivatives of indigo white dispenses with the necessity of washing the printed goods with alkali immediately after steaming, which is a great practical advantage over the older hydrosulphite discharges.

As compared with the oxidation discharges (chromate and chlorate) the Leukotrope-hydrosulphite discharge possesses a still greater advantage in that the deepest shades of indigo can be discharged to a pure white in either the heaviest or the lightest of patterns, without any fear of tendering the cloth in the slightest degree.

Rongalite CI, hydrosulphite CI, and Hyraldite CI, are mixtures of Leukotrope W with Rongalite C, hydrosulphite NF conc., and Hyraldite A respectively, and they may be applied exactly as the ordinary hydrosulphite discharge. The cloth being printed with any of the following discharge pastes after dyeing indigo blue.

WHITE DISCHARGE.

160 parts zinc oxide paste (50 per cent)
100 parts Leukotrope W
240 parts Rongalite C
40 parts anthraquinone paste (30 per cent)
460 parts British gum thickening.

For heavier patterns and lighter shades of indigo, this may be reduced with thickening as required.

WHITE DISCHARGE WITH RONGALITE CL.

160 parts zinc oxide paste (50 per cent)
40 parts anthraquinone paste (30 per cent)
200 parts Rongalite CL
600 parts British gum thickening.

All of the foregoing printing pastes are very stable; they will keep in good condition for at least two weeks.

After printing, the goods are dried, and then steamed for four to five minutes in the rapid ager at 102 to 104 degrees centigrade. They are then run at full width, through a boiling bath of a 1 to 2 per cent silicate of soda solution, well washed and finally dried. Soda ash or caustic soda may be used in place of silicate of soda.

I may say that the yellow given by Leukotrope O while fast to washing is extremely loose to light and that in a general way, the Leukotrope process, while far and away the best process for white discharges, does not lend itself easily to color discharges.

Resist or Reserve Styles.

The "resist" or "reserve" style of printing, like the "discharge" styles, relates to the production of white and colored patterns on a solid dyed indigo ground. The difference between the two styles is in the process only, as the finished goods, by either method, look the same. In discharge printing the discharging agent is printed on the cloth after it has been dyed, whereas, in the resist style the discharging or resisting agent is printed on the cloth before it is dyed. A discharging agent acts by destroying colors already fixed upon the cloth, while a resist acts by preventing the fixation of the color on the goods in the first instance.

White and colored resist effects are produced under dyed indigo by printing the resist pastes on white cloth and subsequently passing the goods through the indigo vat until the shade of blue is dark enough.

The best and most perfect resists are obtained on cloth which has been bleached thoroughly absorbent and starched lightly and cold calendered. The addition of a little copper salt, nitrate of ammonia or sulphate of manganese to the starch acts as a mordant in a way and has a good effect where dark blue shades are wanted.

The resist pastes most commonly used consists essentially of soluble salts which possess oxidizing qualities, and are fixed on the fabric by means of thickenings sufficiently tough and elastic not to chip off or crack during the subsequent operations. In order to prevent "running" and at the same time take advantage of the mechanical obstructions to the penetration of the dye liquor into the printed parts of the fabric, it is usual to add to the reserve pastes such solid plastic substances as lead sulphate and china clay.

The most suitable metallic salts which suggest themselves for resist work are those whose acid character is sufficiently pronounced to prevent them from dissolving out of the resist pastes during the dyeing operations in the alkaline indigo vat. Of these the nitrates, sulphates, chlorides, chromates and acetates of copper, zinc, lead and manganese have all been found to yield good resists under the indigo vat colors. Copper, lead and zinc salts form together the basis of most resist pastes, manganese is only rarely used and then only for special styles.

Much of the protective action of resist pastes is due to their oxidizing action, which has the effect of throwing the indigo out of solution before it can reach the fiber, and also to the fact that during the dyeing in the alkaline vat an insoluble crust or deposit is formed on their surfaces which effectually prevents the penetration of the alkaline solution of indigo white. To this, of course, must be added the mechanical preventive action of the thickening, plastic bodies, fats (if any) in the paste and also that of the film of color which is precipitated on the surface of the resist paste by the oxidation of the leuco compound of the indigo.

When printing fine patterns by the machine the use of china clay and sulphate of lead are avoided as far as possible, since they are apt to "stick in" and fill up the engraving, and thus to give an imperfect result; but for heavy patterns, and for block work, the addition of solid plastic bodies is a decided advantage; and if a brush furnisher is used in printing on the machine, all danger of "sticking in" is eliminated.

Resists for white only may or may not contain lead salts, but if they are intended to work along with yellow, orange or green resists they must be free from lead salts, otherwise, during the chroming process for the development of the yellow, orange, or green, the white itself would be converted into a yellow by the formation of lead chromate.

By the addition of diazo solutions to lead-zinc resist pastes, it is possible, by printing on cloth previously prepared with b-naphthol, to obtain very bright fast red, orange and pink colors.

The resists may be printed on simply bleached cloth, calendered cloth, or cloth that has been previously starched and calendered. The last mentioned is the best way for indigo and the following starch mixture is the best to use:

25 parts wheat starch (or corn)
150 parts 10 per cent glue solution
50 parts Turkey red oil (40 per cent)
775 parts water.

Pad the goods on above, dry, condition lightly, and run through a three-bowled calender, and on this starched and calendered cloth print any of the following resist pastes:

WHITE (1).

150 parts copper sulphate
60 parts lead acetate
400 parts water.

Heat until the precipitation of the lead is complete, then add:

190 parts water
90 parts flour
60 parts British gum.

Boil, cool off, and add

50 parts copper nitrate (80 degrees Tw.)

WHITE (2).

200 parts china clay paste (50 per cent)
100 parts gum senegal solution (40 per cent)
80 parts sulphate of copper (powdered)
90 parts acetate of copper (powdered)
65 parts flour
30 parts British gum
335 parts water.

Boil and add

30 parts tallow and
20 parts resin (previously melted together).

Turn off the steam and add

50 parts sulphate of alumina (powdered)

Cool all off and grind in a mill before using.

WHITE OR YELLOW RESIST (3).

75 parts copper sulphate (powdered)
75 parts copper acetate (powdered)
250 parts lead sulphate (50 per cent paste)
250 parts water.

Heat together and when the copper salts are dissolved, add:

35 parts acetate of lead
35 parts nitrate of lead.

Stir the whole together at intervals during 10 to 24 hours and when the lead salts are precipitated, add

30 parts tallow
250 parts 30 per cent gum senegal solution.

Boil for one hour, replace the water that has evaporated, and then cool and grind for a day or two in the mill.

YELLOW RESIST (4).

200 parts copper sulphate
180 parts lead nitrate
520 parts water.

Boil together, cool, and add

80 parts flour
20 parts olive oil.

Boil and cool and grind well before using.

White resists are well washed after dyeing and soured for three minutes at 50 degrees C. in dilute sulphuric acid and then thoroughly well washed and dried. The lead sulphate may be removed by a run through boiling caustic soda if so desired, but is not necessary.

For yellow or orange effects the goods are printed with resist (3) or (4), and after dyeing they are washed and soured as for white; then washed again and passed for two or three minutes through a cold solution of lime water (2½ grams of lime per liter); washed and the yellow developed by a run through the following chrome bath:

5 parts bichromate of soda
5 parts hydrochloric acid (4 degrees Tw.)
1000 parts of water.

The chrome is kept at a temperature of 40 degrees C. and the speed of the goods is so regulated that they receive an immersion of five minutes. This treatment gives a bright lemon yellow pattern on goods printed and dyed as above. If an orange is wanted, the cloth is further treated for one minute in a raising bath at the boil of

10 parts bichromate of soda
100 parts caustic soda (90 degrees Tw.)
900 parts water.

Wash well and dry.

By printing with two rollers, resist (2) and resist (4) a fabric can be produced with a dark blue ground and a bright lemon yellow and white pattern on it or a white and orange.

The production of a multicolor pattern which includes a light blue pattern on a dark indigo blue ground calls for the application of what are known as discharge resists. The light blue is obtained by first dyeing the cloth a light blue in the vat and then printing an ordinary white resist upon it and finally dipping in the vat again until the ground shade is sufficiently dark. When the resist is washed off we have now a light blue pattern on a dark blue ground. If white, yellow, and orange are also required in the reserved pattern it is obvious that their respective reserve pastes must not only be capable of "resisting" the dark blue ground, but also of actually "discharging" the light blue ground upon which they are printed.

In order to do this, therefore, the ordinary "resist pastes" are modified by the addition of an insoluble chromate. During the souring operation, after the final dyeing, free chromic acid is liberated from this chromate and discharges the light blue, in the same way as we have seen the chromate discharge do in the part treating on "chromate discharge" already dealt with. Green and olive resists are obtained by printing yellow and orange on the light blue so that it is evident that a pattern can be printed containing light indigo, white, yellow, orange, green, and olive on a dark indigo ground.

The chromates of lead, barium, and zinc are all suitable ingredients of "discharge resists"—the first two for yellow and orange; the third either for white, yellow or orange. The lead and barium chromates are unsuitable for white effects, because they deposit on the cloth insoluble sulphates which afterward become converted into chromates again during the chroming operation after the final dyeing.

WHITE DISCHARGE RESIST.

200 parts zinc chromate 65 per cent paste
800 parts thickening D.R.

YELLOW DISCHARGE RESIST.

40 parts Diamine fast yellow B
100 parts 20 per cent British gum paste
100 parts 50 per cent china clay paste.

Boil and add

610 parts thickening D.R.

Heat until the dyestuff is dissolved and then add

150 parts zinc chromate 65 per cent paste.

ORANGE DISCHARGE RESIST.

300 parts water
100 parts flour.

Boil and add at 65 degrees C.

25 parts copper sulphate (powdered)
25 parts copper acetate (powdered)
100 parts copper nitrate 100 degrees Tw.
250 parts lead sulphate 50 per cent paste.

Cool off and grind in

150 parts lead chromate 60 per cent paste.

The thickening D.R. referred to in the recipe for white "discharge resists" is made as follows:

550 parts water
170 parts flour
30 parts tallow.

Boil, cool off a little, and add

90 parts copper sulphate
100 parts copper acetate
60 parts nitrate of copper solution 100 degrees Tw.

After printing the light blue fabric with the "discharge resists" the goods are well dried, dipped dark blue in the indigo vat, washed in water, and then passed through a "cutting" bath made up of : 60 parts sulphuric acid 168 degrees Tw., 25 parts oxalic acid, and 1000 parts water at 50 to 60 degrees C.

After cutting, in which the light blue is discharged by the chromic acid liberated from the lead and zinc chromates, the goods are well washed, passed through a cold solution of lime water, and then chromed and the orange raised as already described, and finally washed and dried.

There are innumerable combinations of colors and effects that may be printed under and over indigo dyed cloth, and they are altogether too numerous for us to go into here with any degree of fullness—for instance, by add-

ing the diazo compounds of para- and meta-nitraniline and orthonitroparaphenetidine to indigo resist pastes, very fast and bright red, orange, and pink effects are obtained. The indigo dyed cloth is first prepared with the usual b-naphthol prepare as for para red, cooled off (after drying) and then printed with any of the ordinary white resists with the addition of the following:

RED.

75 parts Azophor red PN
45 parts water.

Grind to a paste and then add

845 parts thickening X
35 parts acetate of soda.

ORANGE.

(Same as red, but using Azophor orange MN.)

PINK.

20 parts Azophor Pink A
40 parts water
40 parts acetic acid 9 degrees Tw.

Allow to stand 1½ hours, grind to a paste and add

880 parts thickening X
20 parts acetate of soda.

Thickening X is made of

275 parts 50 per cent gum senegal
75 parts water
200 parts lead nitrate.

Dissolve hot and add

300 parts lead sulphate 66 per cent paste
150 parts zinc sulphate crystals.

Cool and grind a day or two in the mill.

The application is the insoluble azo color resists is an extremely delicate thing, and they are really only applicable to the darker medium shades of indigo.

Cloth intended for indigo blue and printed with resist pastes may be dyed in either the continuous dyeing machine or by immersion in the dipping vat, the latter, though more trouble, is certainly the best. In the continuous machine the resist is more roughly handled and cracked and rubbed off and sometimes badly damaged. In the dipping vats, on the contrary, the resist pastes are quite undisturbed, the only danger being that they may "slip" if the dyeing is prolonged by reason of having to dip the goods too often to get the shade right.

(This is the sixth and final article of this series on "Indigo" by Mr. Nanson.—The Editor.)

Designs for Fancy Cotton Fabrics

BY T. WOODHOUSE AND J. IRELAND.

PART FIFTY-TWO.

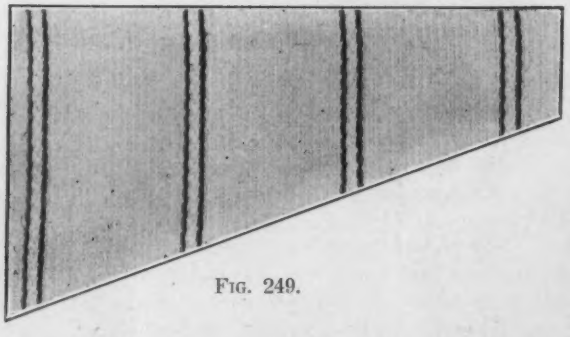


FIG. 249.

The striped cloth in Fig. 249 has good textural qualities; the narrow stripes form the main decorative feature of the fabric, but the broad band of white between the narrow stripes is also attractive. There are 108 threads per inch in the ground with two threads per split, with a 50 per cent increase (three threads per split) in the narrow stripes, while the warping particulars are:

Ordinary white	43	42	= 85
Red	4	4	= 8
Mercerized white ..	8		= 8

101 threads per repeat of the pattern.

The filling is all white yarn of a similar count to the ordinary white threads of the warp, with 72 picks per inch.

Crammed stripes always increase the thickness of the cloth at these points, and are themselves sufficient to produce prominent features; these features, however, are more pronounced with thicker yarns, and especially where colored threads are introduced as in the present example. The white mercerized threads are 2-ply yarns, comparatively thick, and interwoven with the filling so as to prove effective and very prominent.

A very simple and ingenious device is employed to produce the vertical hair line stripes which appear in the ground portion of the fabric. The weave for this section

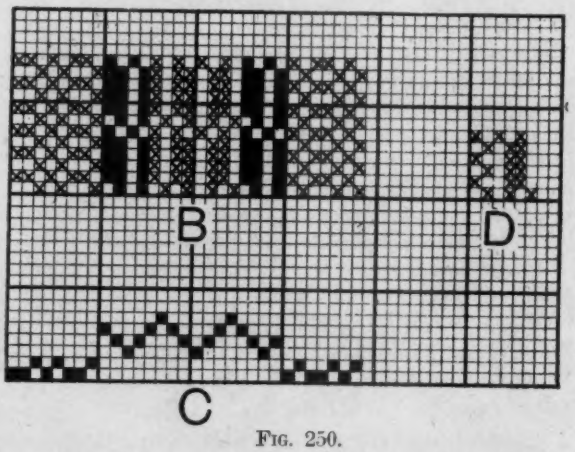


FIG. 250.

is in reality plain, but every 4th and 5th threads are drawn through the same harness, so that the effect is actually 3 single threads and one double thread.

In Fig. 250, the design B illustrates one of the narrow prominent stripes of the fabric along with a few threads only of the ground on both sides of the stripe. These threads are sufficient, nevertheless, to indicate the working of each group which forms the corded warp effect in the ground, the corded effect being due to threads 1 and 2, 6 and 7, and 27 and 28. The solid marks in design B indicate the red threads which form the edges of the narrow stripe. Two repeats in the way of the filling are given, hence the

unit in this direction comprises 6 picks.

It will be noted that five of the mercerized white threads (the five threads marked 4 up 1 down in crosses in design B) form the central warp feature of the narrow stripe, but that each pair has a corresponding cutting thread. This cloth requires only 6 harnesses for its production, and if the threads are drawn in as indicated in the draft C, the weaving plan on 6 by 6 would be that supplied at D.

The pattern illustrated in Fig. 251 is a crepe cloth having vertical narrow stripes fully two-thirds of an inch apart. The warp threads which form these narrow stripes are 2-ply mercerized yarns and much thicker than the threads forming the broad stripes. Each narrow stripe contains 10 threads arranged as follows:

White	2	2	2 = 6
Red	2	2	= 4
Total threads			10

There are 58 threads of ordinary white yarn between each pair of narrow stripes, and set in the cloth with 96

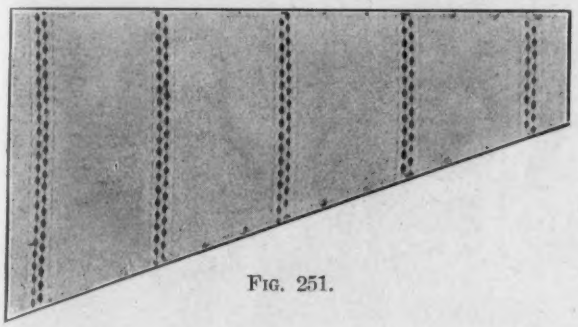


FIG. 251.

threads per inch. The filling yarn, which is also white and of a slightly lower count, i. e., thicker appears 112 times per inch.

The weave of the cloth in the ground portion between each pair of narrow stripes is one of the many crepe weaves and, as usual, when such weaves are used, a richer and prettier effect is produced than that which results when the ordinary plain weave is employed. This crepe weave, which repeats on 12 threads and 12 picks, is shown by the first 12 threads and the last 12 threads in design E, Fig. 252, while the central portion of the design exhibits the narrow stripe with three plain threads at each side. The repeat in the direction of the filling is on 24 picks. The red threads are represented again by the solid marks (each line indicating two threads) and interweave 4 up 4 down with the filling. The other threads of the narrow stripe are white mercerized threads and weave 6 up 2 down in the order indicated.

All the threads of the stripe thus repeat on 8 picks, and the crepe weave repeats on 12. It is therefore necessary to repeat the stripe weave three times and the crepe weave twice before the pattern is complete; in other words, the combined weaves are not complete until they run to a number represented by the least common multiple of 8 and 12. The three plain threads on each side of the narrow stripe prevent long floats in the way of the filling near the junction of the two.

A suitable draft for that portion of the design given is shown at F. It will, of course, be understood that the draft for the crepe threads would have to be repeated until all these threads were drawn through the harnesses. The complete draft requires 12 harnesses, and with this draft the weaving plan for the 12 harnesses would be that at G in Fig. 252.

The comparatively long floats of the stripe threads, coupled with the comparatively thick diameter of these threads, causes the stripe as a whole to rise to a higher

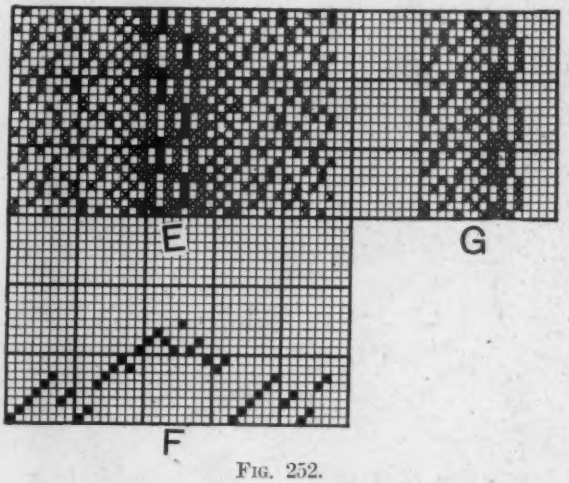


FIG. 252.

plane on the surface than that reached by the remainder of the threads, and this high relief of the stripe in conjunction with the neat crepe ground gives a characteristic appearance to the structure.

The cloth photographically reproduced in Fig. 253 is a good example of a striped fabric and is made from a combination of twill weaves. Both warp and filling are 2-ply mercerized yarns, and are arranged in the cloth in the following order:

Mercerized blue	80
Mercerized white	40
Threads per repeat	120

There are 82 threads per inch in the cloth in the finished condition, and 70 picks per inch of white filling.

What is undoubtedly the most prominent feature of the

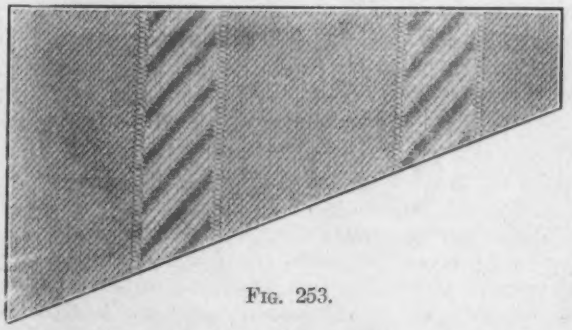


FIG. 253.

cloth is the white stripes; they are bold and attractive in appearance, but blend very well with the alternate but broader blue stripes. The prominence of the white stripes is due in a large measure to the weave employed and to the method of forming the junction between the stripes.

The chief weave employed in the white stripes is a fancy straight twill to the right, graphically shown as follows:

(*Continued on page* 895.)

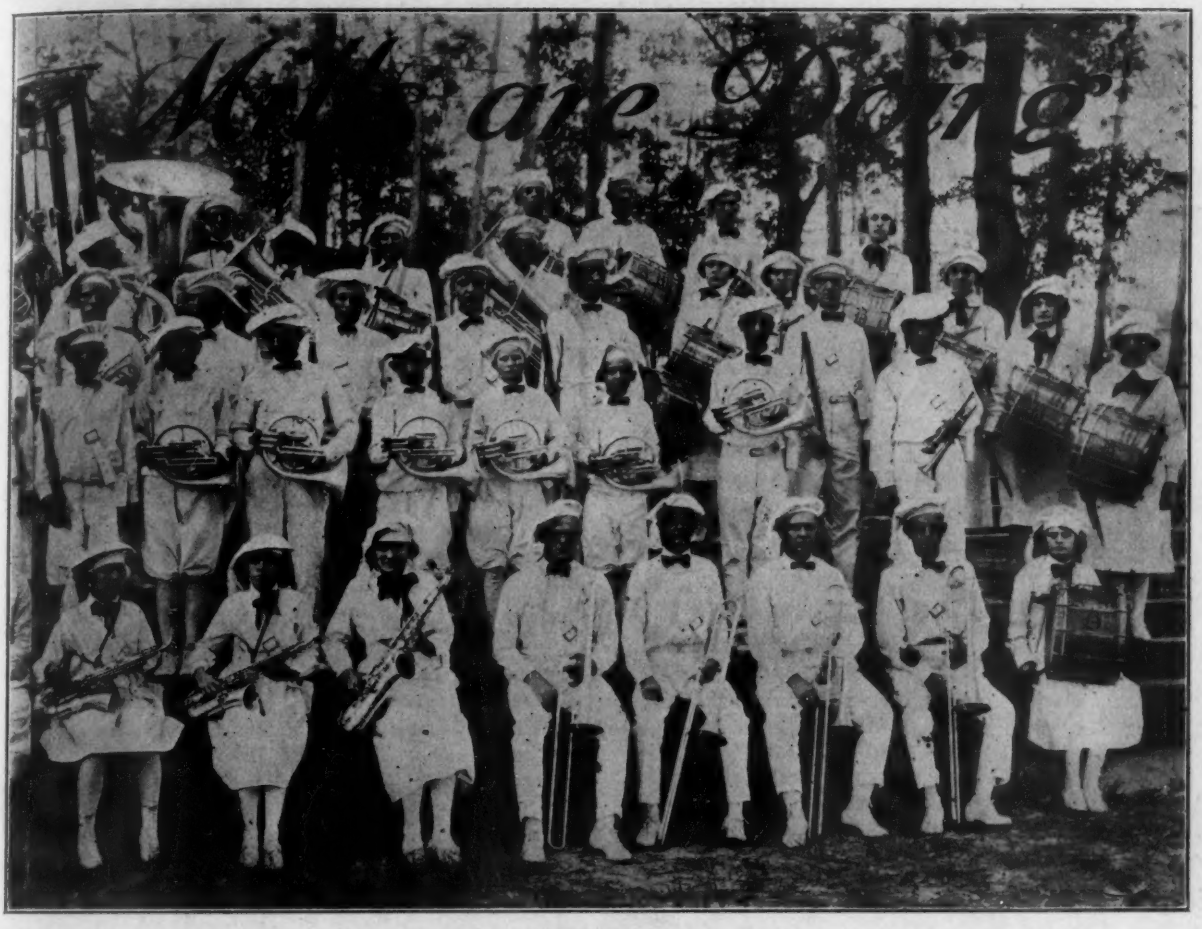
THE MIGNON BAND OF THE AVONDALE MILLS, SYLACAUGA, ALABAMA. TWENTY-SEVEN PER CENT OF THE SOUTHERN MILLS SUPPORT BRASS BANDS.

The band shown in the above illustration, which is maintained by the Avondale Mills at Sylacauga, Alabama, and whose membership is composed of male and female workers in the mills at Sylacauga and the children of these workers, presents an interesting and unique example of what can be accomplished along this line in a cotton mill village. This musical organization, which is developed exclusively from the mill families and absolutely without "importing" musicians, has received notable recognition on several occasions, among which was their being accorded a place of honor in a reception given in Birmingham to President Harding and Mrs. Harding, and at other times this band has led similar celebrations and receptions in that city.

Mignon Band is the name given to this unique organization, which consists of 68 pieces, and its history and evolution into a band including both boys and girls is interesting. Several years ago, at the instance of the Avondale management, and through their cooperation, J. M. Henley organized a band composed of male employees of the mills. Shortly afterward, however, a majority of these men were called into war service, and, met with the emergency, and desiring to keep the organization active, Mr. Henley selected a number of young ladies employed at the mills as prospective band material. The idea proved to be an excellent one, and at the present time the mixed personnel, together with the excellence of their performance, makes this band a unique organization indeed, and offers a suggestion to other mills, who are similarly situated, for activity along this line.

Nor is the band alone the only musical organization developed at these mills. There are five other such organizations, including a drum corps of 26 pieces, a school children's band of 30 pieces, a school children's drum corps of 26 pieces, a ladies' saxophone band of 14 pieces, and an orchestra of 28 pieces—constituting a most unusual musical development for an industrial concern. And, let it be emphasized, all the members of these musical organizations are operatives in the mills, or children of operatives, and the musical features are operated solely for the entertainment and advancement of all employees.

The band has a regular schedule of operation. Regular practice is held each night, with the exception of Monday, Friday and Saturday nights. Monday and Saturday nights are devoted exclusively to orchestra work in connection with the moving picture show. Open concerts are held on Friday nights. In addition, the band promotes an annual chautauqua course. During the entire development of the band, the Avondale Mills have given material assistance and cooperation, and the workers' appreciation for this is re-



flected in their loyal and untiring efforts to reciprocate. When such mutual cooperation is attained, the results are always greater in their influence and effect than is commonly realized. There is a happy association of music and work, and to be provided with opportunity for advancement and education along musical lines is certainly an advantage to the worker which will beyond doubt redound to the benefit of the employer, making the effort mutually worthwhile.

In addition to the musical organizations at the plant in Sylacauga, such bands are promoted at all of the plants of the Avondale Mills, at Birmingham, Alexander City, Pell City, and Sycamore, also at the Cowikee Mills at Eufaula.

Reports from the southern mill territory during the past month showed continued improvement and renewed activity. A number of encouraging reports indicated that more mills were going onto over-time, in some cases 24-hour days, while other reports showed a number of new projects either under contemplation or definitely announced. Construction work on developments already under way continued. Conditions generally are now such as to lend optimism to the opinions and actions of leaders in the field.

Introduction of a new phase of textile manufacturing in this section, and the establishment of Gaston County's 99th cotton mill, will be made by the recently organized Art Cloth Mills, Inc., of Gastonia, N. C. The company will build a plant for the manufacture of fancy and colored silks, ratines, artificial silks, shirting material, novelty dress goods, etc., and as an initial installation, 72 thirty-harness novelty looms will be installed. The authorized capital stock is $200,000.

Henry D. Gagner, the chief factor in the new organization, has been elected president and general manager; R. L. Stowe, of Belmont, N. C., is vice-president; J. B. Reeves, treasurer; and Lillian W. Gagner, secretary. The board of directors is as follows: R. L. Stowe, chairman; A. C. Lineberger, W. T. Love, H. D. Gagner and E. T. Swit-

WHERE?

"In certain sections of this country there are towns and municipalities owned entirely by mill operators, communities whose entire population are subservient to the will of avarice and greed. No schools are maintained to educate the children, but just as soon as they can stand alone they are placed in the mills and factories to grind out their existence. Infants in arms are even made to do their share, for the mothers take them to the factories where they are left in nurseries while the mothers take their places at the loom and before the machinery. Every member of every family is conscripted to the labor, dust-laden air, and noise of the mills."

The foregoing quotation has been credited to Congressman Peter F. Tague of Massachusetts.

zer. Mr. Gagner, the president and general manager, comes from New England, having been engaged in the operation of a similar industry at Adams, Mass.

Development and excavation work for the erection of a new cotton mill at Granite Falls, N. C., has been started by the A. A. Shuford Mill Company, of Hickory, N. C. No information has been given out officially as to the nature and size of the mill, as details have not been definitely settled, it is announced.

It is unofficially reported that the Lincoln Cotton Mills, Huntsville, Ala., are considering enlargement of the plant. Leonard Aitken is general agent.

It is reported that the Wiscasset Mills Co., Albemarle, N. C., will erect a building to be used for the office of their general superintendent.

W. A. Smith, Mount Airy, Ga., has arranged for the installation of cotton mill machinery in a local building, with an initial equipment to comprise about 5,000 spindles.

The contract for the new mill of the Hampshire Spinning Mills, at Clover, S. C., has been awarded to the Gaston Construction Company, Gastonia, N. C. The mill is to be of steel and concrete construction, 133x294 feet, four stories.

An overall factory has been established at Johnson City, Tenn., by the Metcalf Skin Overall Company.

The Columbia Manufacturing Co., Ramseur, N. C., is engaged in erecting a mill with a daily capacity of 15,000 yards of brown sheetings. A total of 132 Draper looms, with 40 of the automatic type, will be installed. J. E. Sirrine & Company, Greenville, S. C., are the architects and engineers.

A fine combed yarn mill will be built just south of Troutman in Iredell County, North Carolina, by the Hall-Kale Manufacturing Company, of Statesville, N. C., recently organized with a capital of $500,000 for this purpose. The plant will have approximately 6,000 spindles. The stockholders are J. B. Hall, Statesville; J. E. Kale, Lincolnton; R. H. Kale, Mount Holly; Franklin D'Olier, Philadelphia; and W. T. Hall, of Belmont.

Work has been begun on a $500,000 cotton mill at Erwin, Tennessee. This plant will be located just across the river from Erwin, and a 5,000-hp. dam will be constructed in the river. A concrete bridge to connect the new development with the town will also be built. It is also reported that about 100 residences for operatives will be erected on the cotton mill development. R. S. Abernathy, of Lincolnton, N. C., and W. C. Heath, of Charlotte, N. C., and their associates are interested in this project.

Another effort to secure a cotton mill for Blacksburg, S. C., has been launched by citizens, who, it is reported, have subscribed the sum of $50,000 to be turned over to reputable interests who desire to invest $150,000 in a cotton mill at that place.

Manetta Mills, Lando, S. C., have just completed the construction of an ice plant.

Winnsboro Mills, Winnsboro, S. C., are constructing a day nursery in the village.

Report persists that a $5,000,000 bleaching and dyeing project is to be located at Edgemont, near Lenoir, N. C. It is said that some of the most prominent cotton mill men in the state are interested in this development, but no definite details have been announced.

J. R. Dover, president of the Eastside Mills, Shelby, N. C., is planning to erect a new yarn mill at that place. The company organized for this purpose, with Mr. Dover as the head, will be capitalized at $400,000, the majority of which has already been subscribed. The new mill will have approximately 10,000 spindles.

Gluck Mills, Anderson, S. C., are building four attractive houses for their overseers. These contain six rooms each, and are fitted with furnace heat and all other modern conveniences.

Lauderdale Mills, Meridian, Miss., have let a contract for the erection of a large warehouse, and for a new concrete floor to be laid in the picker room of the mill.

Report is that a location has been secured by J. F. Banister, president of the Liberty Bank, Liberty, S. C., for the bleachery and finishing plant which he proposes to establish.

Dwight Manufacturing Company, Alabama City, Alabama, is repairing 500 dwellings of employees, and is making other village improvements.

That he will soon be able to announce positive information relative to the location of a large cotton mill at Pine Bluff, was the statement of H. C. Couch, president of the Chamber of Commerce, Pine Bluff, Arkansas, on his return from a recent business trip to points East.

A new cooperative cotton mill at Mexia, Texas, is planned, and a committee composed of Blake Smith, president of the City National Bank, J. E. Winans and Gene Sinclair has been appointed to promote the project, and business men are reported willing to subscribe stock in the proposed company.

Probable enlargement of the plant has been announced by officials of the Calhoun Cotton Mills, Calhoun Falls, S. C., the present plan being to increase the number of spindles from 25,600 to 42,000, and the number of looms from 600 to 1,000. A number of new houses are being constructed in the village for operatives.

G. H. Bresse, who is connected with Planters' & Merchants' Mills, now being completed at New Braunfels, Tex., has a view to establishing such a mill at Victoria, Texas, says a report. The Planters' & Merchants' Mills is a gingham factory and involves an expenditure of $760,000. It is the plan of the company to ultimately organize ten such mills in Texas. The plant now under construction is the only one in the state for manufacturing ginghams.

Contract for an addition to the plant has been let by the Reynolds Cotton Mills, of Bowling Green, S. C. The addition is to provide for several thousand new spindles. Several more operatives' cottages will be built. The capital stock has been increased to $100,000 and the name changed to the Bowling Green Spinning Company. C. N. Alexander, of Clover, S. C., is general manager and treasurer.

A building for use as a textile school is to be constructed at the Brandon Mills, Greenville, S. C., on the Easley Bridge Road, the plot of land being donated by the Brandon Mill for the purpose. Rev. J. N. Wrenn, pastor of the Brandon Baptist Church, has the work in charge.

The Central Falls Mfg. Co., R. F. D. No. 2, Randleman, N. C., will add a number of cards, speeders, twisters and other equipment to their plant.

The cloth room and warehouse building to be constructed at the Seneca (S. C.) plant of the Victor Monaghan Company will be one-story, of daylight construction, 45 x 150 feet. J. C. Cunningham, Greer, S. C., has been

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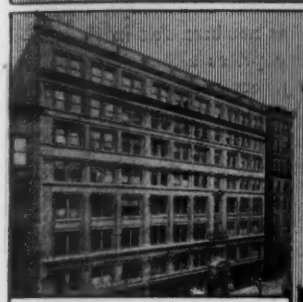

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Barrett Specification 20-Year Bonded Roof on The Scranton Button Company, Scranton, Pa. Engs. & Cons.: Westinghouse, Church, Kerr, Co., New York City. Rfr.: Globe Slag Roofing Co., Scranton, Pa.

Barrett Specification 20-Year Bonded Roof on Hillside Home, Scranton, Pa. Arch.: Edward Langley, Scranton, Pa. Gen'l Cont.: Breen Brothers, Scranton, Pa. Rfr.: Globe Slag Rfg. Co., Scranton, Pa.

Barrett Specification 20-Year Bonded Roof on Factory of Michael Bosak, Scranton, Pa. Architects, Davis & Lewis, Scranton, Pa. Gen'l Cont.: H. Beilman & Son, Scranton, Pa. Rfr.: Globe Slag Rfg. Company, Scranton, Pa.

Barrett Specification 20-Year Bonded Roof on Scranton Lace Curtain Co., Scranton, Pa. Gen'l Cont.: S. Sykes & Sons, Scranton, Pa. Rfr.: Globe Slag Rfg. Co., Scranton, Pa.

Barrett Specification 20-Year Bonded Roof in foreground—Scranton Button Co., Scranton, Pa. Background—Lackawanna Mills, Scranton, Pa. Engs. & Cons.: Westinghouse, Church, Kerr Co. New York City. Rfr.: Globe Slag Rfg. Co., Scranton, Pa.

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awarded the construction contract. J. E. Sirrine & Co., Greenville, S. C., are the engineers.

Judson Mills, Greenville, S. C., are increasing the capacity of their warehouse by the addition of 15,000 square feet of floor space. Gallivan Building Company, Greenville, have been awarded contract for the construction, which is being engineered by J. E. Sirrine & Company.

Formal application for charter for a $50,000 corporation, under the name of Bowen-Crews Company, has been made by O. W. Bowen, W. W. Crews and M. B. Crews, who recently purchased the White City Mills at Athens, Ga., for the purpose of converting it from a spinning plant to a weaving mill. The new company will operate the remodeled mill. The charter provides for increasing the capital stock to $200,000.

Contracts for the electrification of four cotton mills were awarded recently by the Charlotte office of Lockwood, Greene & Co., engineers in charge of the contracts. The mills involved were the Moore Cotton Mill at Valmend, N. C.; the Whitnel (N. C.) Mill; the Hudson (N. C.) Cotton Mfg. Co.; and the Lenoir (N. C.) Cotton Mill.

Inman Mills, Inman, S. C., have placed an order for 500 new Draper looms with which they will replace existing equipment.

The Erlanger Cotton Mills, Lexington, N. C., have placed order for 140 additional Stafford automatic looms which will take care of their surplus yarn production.

Prendergast Cotton Mills, Prendergast, Tenn., will install 500 Draper automatic looms, for weaving print cloths Formerly this plant was a yarn mill, and the looms will use the production of their 20,000 spindles.

A. M. Smyre Mfg. Co., Gastonia, N. C., have begun construction work on their No. 2 mill, which will be two stories, 125 x 300 feet, and will include 15,000 spindles for manufacturing combed yarns.

The New England Mill Situation.

The New England strikes are breaking down gradually. During the past months the gains made in the number of employees working have been about as large as manufacturers have expected in view of the maintained resistance of the unions and the slight change in public sentiment on mill matters. In Nashua about half of the workers have returned. In a fancy goods mill at Newmarket, N. H., a compromise offer of reduction was made and workers have returned. In Manchester, the Amoskeag Company has made very slow progress and a real break is not expected until after Labor Day. In Lawrence, the Pacific Mills had about 25 printing machines in operation, which is about one-half of the complement. In other Lawrence mills many operatives have returned. In Lowell, a strike was inaugurated in the Columbia Textile mills but did not include more than 100 of the employees, principally packing room workers. In Rhode Island, the mills of the Knight company are running about to capacity but the mills of the Goddards in the Blackstone valley are still generally idle. It is a singular fact that the latter mills were willing to concede the 48 hour week, while the Knight mills, that held out for 54 hours, have won the strike.

Mills in New Bedford, Fall River, and in the western part of the state of Massachusetts have done nothing to reduce wages and are running steadily. In Maine all signs of labor troubles have disappeared and the mills there are working 54 hours weekly at a wage reduction of 30 per cent. In Connecticut the mills are operating as a rule on a 54 hour basis and most of them have reduced wages without friction of any moment. Production in finishing plants is no longer affected by strikes and machine shops are having no labor troubles.

The New England strikes have caused a curtailment of over 300,000,000 yards of output of ginghams, napped goods, bleached cottons, and other lines of staple fabrics. As yet this great curtailment has not been felt in the markets to the extent of advancing prices although cotton is high. In fact, some gingham prices are lower than when the strike began and many of the bleached goods have sold at different times this year on a slightly lower basis than the one prevailing when the troubles began six months ago.

From these facts it is believed that the prolonged labor trouble of New England saved the fabric trade from a debacle during the Spring and Summer months. That this is so is shown by the great weakness in all made up goods in first hands in the past few weeks. Cotton dresses, children's garments, and shirts, have been sacrificed in price ruthlessly in consequence of the active competition for business among garment makers and the unwillingness of the jobbing and retail trades to pay higher prices.

The strikes have had the effect of delaying the openings of many lines of wash fabrics for spring. Manufacturers of ginghams do not care to make a price until the largest producer makes a move and it looks now as if that will not come until after Labor Day at least. A number of mills making very fine combed yarn ginghams, not competing with anything made by the Amoskeag Company, have sold their spring product subject to acceptance of prices to be named later on. This will give the mills a chance to get warps dressed and in the looms and will give them an idea of the styles that will be wanted. As no prices have been named on dress ginghams for Spring, there has been no hurry in naming prices on printed lawns, percales, and other goods that must soon be bought for the new Spring season. Thus far the wash goods business done has been in novelties of many sorts.

Inaction on wage matters by New Bedford and Fall River is looked for so long as strikes are being settled in other places. There is naturally considerable ill-feeling as a consequence of the delay in action by the manufacturers of these large centers. They explain that strikes would certainly have been inaugurated in their cities rather than in other places, and as they have borne the brunt of many labor troubles and lost help thereby, they have been averse to moving until it is finally determined whether the other mills can win, as they now seem to be doing.

Business has been light for five or six weeks. In fact since the mid-summer holiday, buying has been fitful. The fine goods mills have done better than many of the print cloth mills. They have booked many orders for fancy goods. Crepes, decorated voiles, fine shirtings, ratines, and many novelties in slub yarn goods have been ordered by the converting trade for the coming spring. The fine goods mills have cleaned up their stocks of plain combed yarn goods pretty well and have held prices more uniform than has been true of print cloth yarn goods. The great bulk of Fall River business done has been on odd widths

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The instability of the cotton future market has made cotton manufacturers very cautious in this section. The lack of confidence in the July 25 government cotton report was general among the manufacturers. They feel that all the private reports of crop conditions cannot be wrong and the government right, and they have in mind the unsatisfactory cotton reports issued by the government last year. As most mills have been unable at any time to secure prices for cloths in keeping with the value set upon the limited supply of spot cotton offered, most cotton buyers have remained out of the market and the mills have been working on old stocks. Just as soon as the Fall demand for goods sets in many mills will be forced to cover on raw material.

The narrow profit margins on which mills have been working for some time have begun to affect dividend disbursements a little and larger factories are now getting back to a pre-war basis of return upon the investment. Contrary to opinion outside of New England there is less apprehension about the future of the investment than many newspaper stories might lead readers to believe. While it is conceded that taxes, labor laws, labor costs, and labor exactions, make profits perilous for the moment, and give rise to a great deal of pessimistic publicity, it is the fact that there is more confidence than surface reports indicate.

Much is being said of New England equipment being out of date, and the moderate adoption of the automatic loom is cited as the one sure sign of New England's decay. Every experienced cotton manufacturer who understands the limitations of any sort of automatic machinery in an industry where the character of the output is changing constantly, knows that the standardization of machinery alone does not spell sure and long continued prosperity. New England is adopting many improvements quietly and they are doing much to lower costs. Water power and electric power supplied from central city stations located at tidewater, to say nothing of the wider use of oil as a fuel, are doing much to lessen power costs.

And there is a great deal of shifting of workers in different departments to take advantage of the opportunities to run different departments more economically, of which little is said but from which much is being accomplished. The elasticity of the output of a city like New Bedford is most imperfectly understood by the general public and by the average cotton mill worker and cotton goods salesman. Hence in the adverse comment about New England it should be borne in mind that mills are established and are still paying dividends; whole communities know nothing else but cotton manufacturing and are not likely to abandon it hurriedly.

An instance of what is being done by intensive production under what may be considered very adverse circumstances is found in the American Printing Company at Fall River. This huge plant of 50 printing machines and 13,000 looms engaged on print cloths, is operating in full and has been running continuously for 18 months. Its chief product is prints and percales and low end draperies. Its goods are being sold and competitors complain that the prices named on them are so low that they cannot afford to meet them. Many converters of percales are unable to buy gray goods in the open market and have them finished profitably in competition with the American.

The sole explanation is that the whole of this large plant is being operated and overhead costs are kept down. New products are being offered constantly, some of the printing machines now installed being capable of printing 14 colors.

Mill engineers who have been looking over recent improvements in the Amoskeag plant at Manchester, N. H., declare that when the strike is over with and forgotten this huge property will turn out goods cheap enough to make competitors feel that the Amoskeag is going to remain in the world's markets for some years to come. Chief among these improvements is the building of a $2,000,000 dam for conserving the power of Amoskeag Falls and distributing its power to every machine on the place.

High taxes on mill properties in New England are now being taken to the courts, the Fall River mills having gone to court with the local board of assessors in order to determine the equities involved in mill as against private property taxation. Out of the examination that is sure to follow it is probable that such exorbitant charges as those imposed in recent years cannot be legally sustained. As for labor conditions in the future, it is said that this year's strike experience is not likely to be duplicated again in New England in a generation to come.

Cotton Comment.

BY H. AND B. BEER.

New Orleans, Aug. 16th, 1922.

In the annual report of the New Orleans Cotton Exchange, spinners takings of American cotton the past season were 13,084,000 bales vs. 10,390,000 for the previous season, leaving the world's carry-over of American cotton July 31st, at only 4,904,000 bales vs. 9,364,000 last year.

Since whenever the world's carry-over of American is reduced to 5,000,000 bales there is a scarcity of cotton, as was noted this Summer, especially in the South, the trade will have to depend almost entirely on the growing crop for this season's requirements.

The consumption of American cotton by the world last season was 12,804,000 bales against 10,330,000 for the previous season, indicating that the trade will likely need about 13,000,000 bales for this season.

Where such a supply is to come from, 13,000,000 bales, is difficult to say since the present outlook is for a crop less than 11,500,000 bales, as advices from the interior indicate deterioration in excess of the normal since July 25th.

Returns to Washington show that the world's consumption of all kinds of cotton last season exceeded the world's production of all kinds of cotton last season by 1,717,000 bales, consumption having been 16,914,000 bales, production only 15,197,000.

It is evident, therefore, that the world's consumption, especially of American cotton, this season will exceed the world's production this year for the second consecutive season. Under the circumstances it is not difficult to appreciate the strong statistical position of cotton, present and prospective, more so prospectively than otherwise.

That a high average of prices will be obtained for this year's crop is indicated by the fact that the world took 13,084,000 bales last season at an average price of 17.78 cents per pound, with the price at the close of the season standing at 21.25, and the prospective supply, including the world's carry-over, promising 1,000,000 less than last season.

On the 1st inst., when the government forecasted a crop of 11,449,000 bales, middling cotton in the New Orleans market sold at 22.50 cents per pound, but prices subsequently declined owing to the trade apparently discrediting the government report because of it having indicated a smaller yield than private returns promised, and because of scattered rains in Oklahoma and Texas.

Meanwhile the rains in the Southwest have been insignificant, especially in the dry areas, weevil and worms have become more numerous and active in other sections of the belt, and, as a result considerable deterioration is reported to have taken place during the past three weeks, making it likely for the next government report, due September 1st., to indicate a smaller crop than was promised by the government on August 1st., perhaps by about 500,000 bales.

In that event spinners will have to face returns promising a yield of about 500,000 bales less than was indicated on August 1st, and it remains to be seen what the attitude of the trade will be under the circumstances, as a crop of only about 11,000,000 bales, would probably prove inadequate for consumptive requirements by about 2,000,000 bales.

The last Census Bureau reports showed that there was only 2,703,000 bales in the United States on July 31st, vs 4,834,000 bales last year, distributed as follows: American mill stocks 1,215,000 against 1,110,000, in public storage 1,483,000 vs. 3,723,000.

Of late crop accounts are being reduced, in Texas as well as elsewhere, and unless Texas produces 3,500,000 bales, the crop will hardly amount to 11,000,000 bales. In this connection inspectors who have been over Texas are of the opinion that the State will do well to make 3,000,000 maximum, in which case the total crop may not be more than 10,500,000 bales.

We consider the present situation a most serious one from the standpoint of supply and likely to be of much concern to American and foreign spinners in the not far distant future.

The feasibility of applying electric motors for driving pumps of all kinds is shown in a 60-page bulletin now being distributed by the General Electric Company, which also points out the considerations involved in selecting the best type and construction of motor and control for different installations. In this discussion, rotary, reciprocating and centrifugal pumps and their characteristics are considered separately. While it is pointed out that one of the most beneficial applications of this practice is in reclaiming by irrigation what would otherwise be waste land, other particular adaptations mentioned are chemical plants, ice manufacturing, refrigerating plants and others. In addition to the general pumping discussion, the bulletin gives a complete list of engineering tables that are calculated to help in the installation of electrically operated pumps. The bulletin is entitled "Electrically Operated Pumps" and is known as Bulletin No. 48028.

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Notes About Men You Know.

C. F. BURNEY, who has been sales manager and superintendent at the Tupelo Cotton Mills, Tupelo, Miss., for several years, on August 1st of this year became associated with the Texas Cotton Mill Company, McKinney, Texas, in the capacity of sales manager. Mr. Burney went with the Tupelo Cotton Mills on April 1st, 1919, as sales manager for the products they distribute direct to the retail trade. After two years in this position he was made sales manager and superintendent. In his new connection he has charge of the sale of the colored cotton fabrics made by the Texas Cotton Mill Company.

J. F. LEHMAN has taken the position of night overseer of carding at the Merrimack Manufacturing Company, Huntsville, Ala. He was formerly carding overseer at the Avondale Mills, Birmingham.

ERNEST FALLOWS has been made general superintendent of the Winnsboro (S. C.) Mills, succeeding J. M. Williams, resigned.

A. G. Pittman has resigned as carder and spinner at the Hart Mills, Tarboro, N. C., to become overseer of carding at the Fountain Mills, Tarboro.

Leo Minchen was promoted from second hand to overseer of spinning at the Hart Mills, Tarboro, N. C., upon the resignation of A. G. Pittman.

W. O. JONES has been promoted from second hand to overseer of carding at the Hart Mills, Tarboro, N. C.

C. E. HALL has resigned as superintendent of the Fountain Mill, Tarboro, N. C., to accept a similar position with the Hopedale Division of the Consolidated Textile Corporation, Burlington, N. C.

J. L. DAVIS, superintendent of Grendel Mill No. 1, Greenwood, S. C., died at 8 o'clock Tuesday morning, August 1, after an illness of several months. Mr. Davis had been superintendent of the Grendel Mill since 1911. He was a member of the Woodmen of the World and a Royal Arch Mason. He is survived by his wife and eleven children.

W. A. MCGEE has accepted a position as salesman for the Detroit Graphite Co., with headquarters at Greensboro, N. C. H. M. Perry, who has been traveling in North Carolina for the company, has been transferred to the Greenville (S. C.) office.

M. T. POOVEY, who recently resigned as superintendent of the Gastonia (N. C.) Cotton Manufacturing Company, has accepted a similar position at the Henry River Cotton Mills, Hildebrand, N. C.

H. GARDNER MCKERROW, who for the past three years, has been advertising manager for the National Aniline & Chemical Co., Inc., has resigned, and will engage in business on his own account in New York, as an advertising and merchandising consultant, specializing in textile and chemical matters.

A. V. WRIGHT, formerly second hand at the Baldwin Mill, Chester, S. C., is now overseer of spinning at the Hartsville (S. C.) Cotton Mills.

E. M. GARDO, who recently assumed charge of the silk department of the Judson Mill, Greenville, S. C., has been overseer of weaving at the Drayton Mills, Spartanburg, S. C.

CALVIN OSLEY has taken the position of overseer of spinning at the Lawrenceville (Ga.) Mills.

R. BIGHAM SMITH has accepted a position as salesman representing the Danville Conditioning Machine Co., Inc., of Danville, Va., manufacturers of a yarn conditioning attachment for Foster winders. Mr. Smith, who for the past three years has been connected with the Bibb Manufacturing Co., Macon, Ga., in general office and testing laboratory work, is traveling the states of Georgia, Alabama, Mississippi, and Tennessee, in his new connection, with headquarters at 123 Peeples St., Atlanta, Ga.

H. G. CLEGHORN has been made night overseer of spinning at the Laurel (Miss.) Mills, succeeding John Davis, resigned.

M. C. DAWKINS has accepted the position of overseer of carding at the Blue Buckle Mills, Rock Hill, S. C. He was formerly night overseer of carding at the Mecklenburg Mills, Charlotte, N. C.

G. C. BRAMLETT has been made night superintendent at the Maginnis Mills, New Orleans, La. S. E. Perkinson recently resigned as overseer of weaving at this plant.

WALTER DUNN has been made overseer of weaving at the Anniston (Ala.) Manufacturing Co.

C. F. MUSGRAVE has taken the position as superintendent of the Renfrew Mfg. Co. (Mill No. 2), Adams, Mass. He was formerly superintendent of the Tamarack Mill of the Jenckes Spinning Company, Pawtucket, R. I.

A. M. BATES has resigned as cloth room overseer at the Anniston (Ala.) Manufacturing Co.

C. BARTON has accepted the position of weaving overseer at the San Antonio (Texas) Cotton Mills.

F. C. Howell has been made overseer of weaving slashing and cloth room at the Vance Mills, Salisbury, N. C. He was formerly connected at East Durham, N. C.

DR. E. W. FRANCE, director of the Philadelphia Textile School, recently made a six weeks' trip to France, England and Germany in order to make a study of the foreign business situation and to get a first-hand view of existing conditions in the international textile industry.

J. F. CANNON was re-elected vice-president and general superintendent of the Wiscasset Mill, Albemarle, N. C., at a recent meeting of the stockholders. Mrs. J. W. Cannon was named as president, P. A. Groves, treasurer and M. A. Boger, secretary.

TOLHURST EXTRACTORS

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The photograph shows a battery of 40 inch-48 inch **TOLHURST** "Self-Balancing" Extractors operating in a well-known New England factory, famous for its output of worsted dress goods.

The initial machine was installed in 1889 and numerous repeat installations emphasize the satisfactory service consistently given.

We should like to tell you about the notable service these machines are doing in this and other mills. And we should like to demonstrate to you the **TOLHURST** Extractor uniquely suited to your requirements.

We construct Extractors of all types and sizes for all purposes. In ***Tolhurst*** *motor-driven machines (both direct-connected and belted) are now incorporated special features of definite advantage to the Textile Industry.*

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A. P. ALDRICH, JR., general manager of the Aldrich Machine Works, Greenwood, S. C., has become associated with the Saco-Lowell Shops as special engineer. The report states he will have charge of the adaptation of ball bearings to the various types of textile machinery manufactured by the Saco-Lowell Shops.

THOMAS W. HARVEY, who for the past four years has been manager and superintendent of the Millen Cotton Mills, Millen, Ga., severed his connection with the company, effective July 15. These mills were purchased some time ago by the Western Reserve Cotton Mills Georgia Company, and B. S. Piper has become resident manager and superintendent.

J. W. KANNER has become superintendent of the Pickett Cotton Mills, at High Point, N. C.

E. L. HEGE has resigned as agent and general superintendent of the Morice Twine Mills Corporation, Roanoke, Va.

R. L. SHORT has been promoted from assistant superintendent to superintendent of the Morice Twine Mills Corporation, Roanoke, Va.

R. L. SANBORN, from West Kennebunk, Maine, has been made general overseer of the Morice Twine Mills Corporation, Roanoke, Va.

C. N. JAMES has become overseer of spinning at the Ronda (N. C.) Cotton Mills. He was formerly at Statesville.

W. F. OSLER has been appointed agent for the Morice Twine Mills Corporation, Roanoke, Va.

W. S. HENDERSON is now night assistant superintendent with the Bibb Manufacturing Co., Columbus, Ga. For 26 years he has been general overseer of carding at the American Net & Twine Co., Blue Mountain, Ala.

Steel Storage Equipment and Inventories.

An example of the economy in storage space, time, and labor, and the elimination of disorder and confusion, especially at inventory time, which may be secured by the installation of steel storage equipment, is given in the following story. This also brings out the advantage of this type of installation from the standpoint of safety. The story appeared in the February issue of the "Hamiltonian," house organ for the Hamilton Woolen Mills Co., Southbridge, Mass., and in relating the experience of this concern in changing to the modern type of equipment, says:

THE OLD METHOD.

"The wooden benches that formerly held our finished goods in Building 32 are being replaced by the steel racks, here illustrated. The fourth floor is now completely equipped, and similar action on the other floors will follow soon.

"Storage space is increased practically a third by this method, because of the systematic and compact system of piling, and the stock taking is simplified to the extent shown in these pictures.

"Prior to last December, it was necessary for the whole force of the packing room to drop all other work until the inventory was taken. Goods were piled in orderly fashion, but in such a style that each piece had to be taken up, piled on a truck, carried to the adding machine, the yards taken, carried back to the proper place and repiled. It was a solid week's work for the packers and the office force. At the last inventory, the two men and the two young ladies shown, did the whole fourth floor in two days—with practically 25 per cent more goods stored there than ever before. It used, formerly, to take about two days to do it, but with less goods and four times as much help. Then, too, there is not the confusion of trucks being pushed back and forth, and the everpresent likelihood of a pile of goods being called twice or not at all—although that never happened.

THE WAY IT'S DONE TODAY.

"There is also less danger of water damage resulting from the bursting of an overhead sprinkler, as there are solid steel shelves over the first and second tiers of cloth, where before there was no covering for any; and such an accident would have been a very serious matter.

"Stock taking used to be looked forward to with dread—considered a bug-a-boo—but with the stockrooms completely equipped with Lyon racks, its terrors are gone and the occasion has become but an incident."

The accompanying illustrations, referred to in this story, show a comparison between the conditions at the Hamilton Mills "before and after taking." They are furnished through the courtesy of the Lyon Metallic Mfg. Co.

AN OLD TIMER SAYS

All overseers know what it takes to make a successful superintendent? ? ? ?

Well, not hardly—what I should have said is that all overseers *think* they know.

No! this is not going to be an article berating the overseers, so keep on reading, but I will do my best to lay down a few facts and incidentally give some advice, not hot air advice, but advice which is born of long experience and gathered from some of the most successful superintendents of the South.

My sole aim is to be of help to overseers and second hands who have "spunk" enough to deserve promotion.

Strange as it may seem to some people, it is a fact that practically the same reasoning used in bringing out points as to "What does it take to make a superintendent?" may be made to apply equally as well to other positions. For example, "What does it take to make a second-hand?" or "What does it take to make an overseer?"

With this explanation I hope no overseer will get peeved at what I am going to say, but I do hope he will get so darn mad that he will take some of the advice home to himself and that it will make him a better man.

It has been a source of much thought to decide what *one* thing holds most overseers back more than anything else, and although my mind is not fully made up as to just exactly what that one thing is, the word "selfishness" sure does occupy a very prominent place, and it wouldn't surprise me in the least if "selfishness" finally gets the majority vote.

You know, it's so doggone *little* to be selfish I can't see why it is so easy for it to get a strangle-hold on so many overseers.

How many times have you given one of your children the dickens for showing his stubborn selfishness with his little sister or brother?

One dictionary says selfishness is "undue regard for one's own interest, regardless of others."

Please take particular note of that word "regardless." Of course not many overseers will admit that they would go so far in their selfishness as to disregard the interest of the superintendent. But right there is the point. *They do.*

Maybe some of them do not realize it, and that is the object of this month's talk—to wake them up to the fact that they not only injure the superintendent's job, but they damage their own chances of advancement.

I have actually known carders who were afraid to make good roving for fear the spinner would run it all up and the superintendent would be near-sighted enough to give the spinner all the credit for it.

And the same relation often exists between the spinning room and the weave room. Yes, and most any old-timer can cite you many specific instances where overseers have lost their jobs just on account of such selfishness as this.

And when the superintendent decides the roving or yarn needs another tooth of twist—Ye Gods! how he does have to scheme around sometimes to get it put in without making some overseer think he is trying to favor the other man.

No overseer will ever become a successful superintendent until he learns to "think from the top down, as well as think from the bottom up."

When you begin to think from the top down you can oftentimes put yourself in the superintendent's shoes and see what he is driving at.

The whole organization is supposed to be in the business of making the greatest number of pounds of product for the least amount of dollars, but some overseers lose sight of that fact in their work.

No doubt many overseers and superintendents who read this will say that the superintendent in charge of such men should discharge them. Hold on now! You just think right good and hard of your own feelings, your own actions, especially when you are confident the superintendent can't read your mind; do this before you make too many charges.

How about the last time the superintendent asked you to see if you did not have a hand that could spin or weave or inspect or run frames and if so, to send the hand down to an overseer who was short of help? Do you remember just how hard you tried to find that hand? Or did you decide that you didn't have any more than you needed and that Smith or Jones or whatever that other overseer's name might be, "has been talking pretty big anyhow; now let him sweat."

There is no need to jump at the conclusion that "Old Timer" is fool enough to think the carder should run the spinner's job or that any overseer should run any job but his own. Your conscience will tell you whether you are guilty or not. I know there are many things you can say in rebuttal against the superintendent, but I ask you in all fairness to apply this reasoning to yourself and not to someone else.

You just leave Mr. Superintendent to me and I will give him a rap that will make him sit up and take notice.

Now I am going to make a statement that may be sort of hard for you to believe, but I have proof to back it up, so hear me—

There are more superintendents needed than there are overseers to fill the places.

(*Continued on page* 883.)

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How Other Men Manage

Practical Discussions by Cotton's Readers on all varieties of Mill Subjects

Handling "Flat Threads" in the Loom.

EDITOR COTTON:

Reading in the July number of COTTON the report of the Southern Textile Association meeting at Wrightsville Beach, I notice what Mr. L. R. Gilbert of Raleigh had to say about his trouble with flat threads, as he calls the patterns that are drawn two threads as one.

At the Chace Mills in Valley Falls, R. I., over thirty years ago, on ginghams and shirtings, we had a new line —25s yarn, 2100 ends, blue and white of various patterns, with the body dark blue, about 75 per cent, and the remainder white. After the first of these were beamed (this was Yorkshire hand dressing) and all the white threads drawn in two as one or flat, they were put in the looms. They did not run long until the trouble began, and something had to be done.

The weaver put a rod under the white yarn and had all the surplus yarn taken up to the ceiling. At the beginning of each cut he pulled the slack through and started new again. That worked o. k. until we found the more correct way to do the stunt.

To begin with, a good mill man ought to study a little before going ahead and making warps all on one beam where a large part of the yarn is not going to be interlaced by the filling. In our case we soon found that the white yarn was too long, and we found that by putting more tension on the white yarn—enough to keep it depressed slightly on the loom beam—there was no more trouble at the looms. The white yarn mentioned did not go into the selvage. We used a two-ply yarn from a creel set on the floor for this purpose. Of course this kind of beaming takes good judgment. As far as I know this remedy is good on all short chain beaming where one has control of the various pieces and colors of warp that are drawn in different than plain weave.

"Now all this excess yarn is wasted," some one will suggest, "Why not make your flat yarn shorter when warping?" Who knows the actual difference in the take-up between the body warp and the flat? If we should try to save the yarn by short warping we might go over to the other extreme and be shy on our body warp. So I think if we can get good cloth and have some yarn to cut off at the beamer, we will do well.

I do not know what kind of processing they do at Mr. Gilbert's mill. If he has short chain beaming he can easily overcome the trouble. If long chain and slashing, it might be a little more difficult to put all the yarn on one beam to weave off all right, as the friction roll stands in the way to some extent as to holding tight one special section or beam. I would suggest that if there is enough flat yarn in a warp to make it on one beam, to weight it a little extra at the back of the slasher; then lay in a little thinner at the comb. In other words, give the flat yarn a chance to depress more than the body of the warp.

Mr. Gilbert states that at his plant they could not take up the slack, as Mr. Ingle suggested, as the cuts were too long. I do not know the length of the cuts, but if that is his case he is surely taking a long chance by trying to weave such a percentage of loose yarn into cloth. I do not think the amount of slack is as much as Mr. Gilbert believes. If he is making a 60-yard cut and the actual take-up was 8 per cent on the plain weave, then the flat threads, if being only crossed every other time by the filling, would make about 4 per cent slack.

Mr. Gibson's suggestion will not work out unless the body or plain warp will stretch about 4 per cent, or the difference in take up.

I could go on indefinitely, but I just thought I would make these suggestions. If Mr. Gilbert can't get straight after trying some of these suggestions, his best plan is two beams.

Mack (Ga.).

We invite our readers to make use of this department for the discussion of any and all problems arising in the mill or the finishng plant. Questions, answers or letters need not conform to any particular style and will be properly edited before publishing. The editors do not hold themselves responsible for any statements of opinion or fact which may appear in this department unless so endorsed. This department is open to all.

Reverses the Direction of Travel on His Card Flats.

EDITOR COTTON:

Has anyone besides myself tried reversing the direction of travel on the card flats?

We are making 57s and 74s yarn, using local 1¼-inch staple cotton. Like many other mill men I had considerable trouble with neps or unripe fiber in the stock, and have tried numerous settings on both the pickers and the cards, trying to remove them.

My overseer of carding suggested one day that we try running the flats in the reverse direction. Since I am always willing to try anything once, I told him to go ahead. We tried it on one card, and from the appearance of the web, we were getting some of the neps out. After having run this card for a number of hours, and thinking it was doing better work, we decided to change one half of the cards in the room so that we might see the difference in the yarns in the spinning room. Standing in front of the warpers and looking back through the ends as they came from the creel, we saw quite a difference in the ap-

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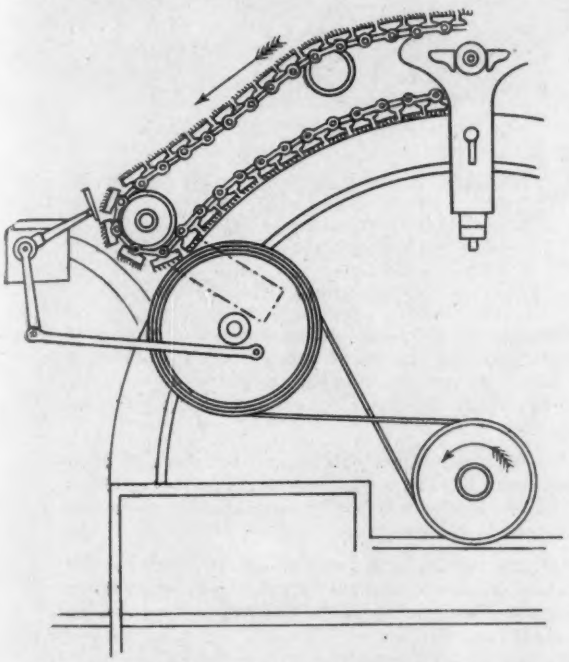
pearance of the yarns. We also made a test of the breaking strength and found we had increased the strength at least two pounds, which we think a very good improvement on 57s yarn. From general appearances, I believe we have reduced the neps about 50 per cent.

After running one half of our cards this way for quite a while, we decided to change all of them and are today running them all with the flats reversed.

In order to change the flats we first changed the belt which drives them so that they would run in the opposite direction. Not being able to strip them with the arrangement on the card, we first stripped them by hand, merely operating the stripping comb by hand and running it faster. Seeing this worked satisfactorily we rigged up a connecting rod, by which we drive the comb from the flat driving pulley. A hole was drilled off center in the pulley and tapped for a cap screw and the connecting rod fastened by this. (See accompanying sketch.) The connecting rod was then attached to an arm which was placed



SHOWING METHOD OF DRIVING THE STRIPPING COMB.

on the end of the comb. The eccentric motion, operating at the speed of the cylinder, keeps the flats combed off as well as before the change was made. I might say that we have not as yet devised a plan whereby we can brush the flats as we did before.

I have every reason to believe that this is the proper way to operate a card, because we all have a certain amount of motes which are not taken out in the pickers, and these motes have to be taken out in the card. Of course we have mote knives to take them out, but sometimes they come out on the flats. When one of these motes strikes the flats on my cards, it does not have to travel all the way to the front of the card, interfering with the carding process, but is taken out on the first flat leaving the card, at the back. We therefore finish our carding process with a clean flat.

Should anyone see fit to experiment as we have he must watch his waste and make his settings on the cards in accordance with the amount of waste he wishes to take out.

Contributor No. 73.

Classifying Defects in Cotton Cloth.

EDITOR COTTON:

As promised in a former letter, I would like to outline my idea of naming defects, describing what they are and stating what I would like to call them.

Thin Places. Now a thin place as I see it is a place where the filling for some cause has given out and the loom has not stopped as it should have done. These places vary from a thread or so up to several inches, and I have seen some that were a foot or more in width. All of these are "thin places". Some men would like to compromise and call the smaller ones "shuttle marks", "misspicks", etc. But I contend they are all "thin places", and should be so called. True, a small thin place is not as bad a place as a large thin place, and you can let some few such places go on certain kinds of goods, but why not say "small thin places" and "large thin places?" It only confuses matters to do otherwise, and I am sure that it hinders in the getting of defects corrected, for if your overseers, second hands, and fixers see that you are willing to compromise, believe me they are quick to follow the lead, and unless you term the place "thin" they will make a joke of you and do nothing to prevent them until the loom has gone so far that it is in some cases making rags. Now I know whereof I speak in this matter, for on more than one occasion where I have tried to get overseers, second hands, etc., to pay more attention to "shuttle marks" I have had them laugh at me and say, "Why should I worry, the 'Old Man' don't think they hurt."

Threads Out. Possibly this is a point on which more men agree as to a proper term than any other, yet some men want to be different even in naming this common defect; some say "long runs," "thread runs," etc. This causes more or less confusion among the men in the mill, and in so many instances, the new men especially, do not know what is meant. A thread out is, as every one at all informed knows, a place where a thread for some cause has broken, and the loom has been allowed to run right on. As I see it, the reporting of this defect is, in many instances, more important than the damage to the goods seems to justify, for if it is coming from an automatic loom the loom is certainly out of fix or else it would stop when the thread broke. If this particular loom is not corrected, it has been my experience that it goes from bad to worse, and what may have been only a short thread out today, tomorrow may evolve into any one of a dozen defects that will be serious and make "seconds." I would call a thread out, *"a thread out,"* for the term is so simple that no one can misunderstand it. I would give everyone around the plant to understand that it is indeed a defect, and if for no other reason than because of its progressive nature, I would not tolerate it at all. Now please do not rush to the conclusion that I am not classing "threads out" when sufficiently bad as defects, for on nearly all grades of goods they are, when sufficiently bad, undoubtedly defects, and on some goods they will not go at all. But as a whole they do less damage, I believe, than any other defect common in the mill. What is said of their progressive nature might

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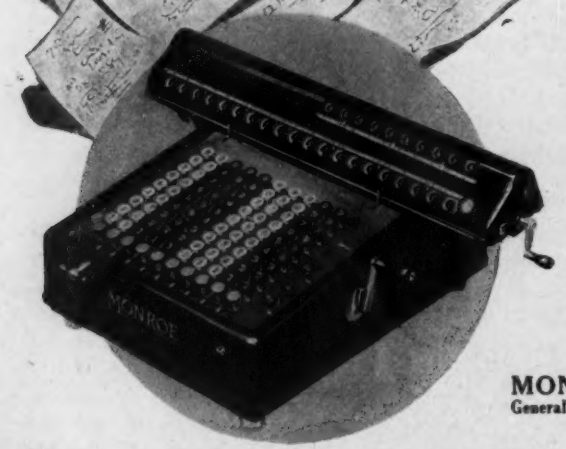

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to a less extent be said of all small defects with which so many mill men seem willing to compromise. I would say much less about a piece of cloth that was literally ruined than about one with a lot of "small thin places" or "short threads out" that I might pass up as first quality goods. The most successful superintendents that I have known have been men who took this attitude.

Floats. Now this one word has caused me more ridicule among mill men than almost any other one thing in my career, and yet it is not by any means original with me. While reading an article somewhat like this many years ago I ran across the name and have seen it used many times since. I can conceive of no name that so aptly applies to a place where the warp and filling for some cause has failed to interweave for a small place or spot anywhere between the selvages. This is, I understand, usually caused by a tangle behind the harness. I have already dealt with what some men try to call them and will not handle it again here. I contend they should be called "floats."

Scratch Ups. Now thin places and floats are, at some mills, and on some goods, "scratched up." This, at best, is a very questionable practice, and I believe has been discarded by many of the modern mills. Yet on some of the cheaper cloths it might be done to a very limited extent, if very carefully and neatly done. In any case where this is practiced I believe that it should be put on the imperfection report, and where not neatly done it should be cut out in the cloth room. The report should show just how many were being attempted and how many were getting by, for, as I say, I consider this a very dangerous practice. It is much more profitable to fix the loom than the cloth.

Rope Filling—Snubby Filling—Tag Filling. You will note that I have grouped all these together for discussion, but I certainly would separate them on the report, because they are somewhat similar and so many confuse and misapply their real meaning. All these are, in a sense, caused by the filling sliding or slipping off the bobbin unevenly. "Rope filling," as the name implies, are those places that pull off in great ropes sometimes extending entirely across the goods. It is not my purpose to discuss the cause of this or any other defect, as a cloth room man is not supposed to know anything about any other part of the mill, and at so many places he is not supposed to know much about anything. But when these defects are properly classed and reported I have found that the superintendents who were really alive and knew their jobs were not long in determining whether the spinning or the weaving was to blame. "Snubby filling" is somewhat similar to "rope filling," but is pulled off in lumps, at various places in the cloth. "Tag filling" is the same as snubby filling only as a usual thing it is much smaller and near the selvage. From this small "snub" there are tails or tags, a few double threads out beyond the selvage, and these whip around the filling fork thus keeping the loom running until they break, thereby causing a thin place, generally small, it is true, but a thin place nevertheless, and if allowed to go unnoticed this defect soon grows out of all proportion.

Overshots. Harness too low or too high, usually near one selvage, causes the filling to pass over or under the warp at places, sometimes only a few threads and at far distant intervals, then again almost or quite continuously. Some try to draw a very fine distinction between "overshots" and "undershots" but this I consider another effort to pass the buck, for as I see it there is no difference whether the filling "shoots" over on top, or under the bottom of the warp, as it is out of place just the same.

Dropped Thread. A harness eye too low or too high, causes the thread to only catch in places. Many dispute the term applied to this defect, but I contend this is proper and await some suggestion of a better term.

Hanging Thread. Threads left hanging on the face of the goods where the weaver has pieced in and was too careless or too rushed to trim the end off. In most goods, especially bag and print cloth, this is a serious defect.

Loose Threads. Loose warp ends that have been allowed to run out and have been brought over the arch of the loom and wound up in cloth roll. This is a most pernicious practice, and one that leads to no end of trouble. True the cloth room machinery will take some of these off, but not all and even when it does it causes a world of trouble in this department. The waste in the cloth room from this source alone will easily pay for the extra trouble of keeping this defect corrected in the weave room. But this is only another of the many cases where the cloth room gets the short end of most every deal, in most every mill. My experience has been that the cloth room is the last place to receive consideration until *quality* is to be considered, and then everything is expected of it. I would like to stop right here and write an article on this subject alone.

Wavey. Cloth woven unevenly, having a cloudy or "wavey" appearance. In some goods, especially shade cloth and lawns, a very serious defect. And certainly not to be desired in any goods, for if not a defect within itself on your particular kind of goods, it is most certainly another kind of progressive fault and if allowed to run unchecked will lead to other and more serious defects.

Thick Places. The opposite of thin places, where a loom is letting back too much, and a place too thick is the result. In shade cloth and fine prints it is a serious defect and if carried to the extreme, a defect in any kind of goods. In most cases, however, it is preferable to thin places.

Oil, Black and Yellow. As stated in my previous letter I most certainly would distinguish between black and yellow oil. A yellow oil spatter is oil spots sprinkled on either the warp or on the cloth while on the loom, usually coming from the shafting. A black oil spot is the same thing only black in color, usually coming from the cams or dobby head on a loom. These spots are small and have the appearance of having been sprinkled or splashed on the work. Larger yellow oil spots on either warp or cloth usually come from some hanger that drips over night or over Sunday. Very often this occurs in the cloth room or some other place where the cloth has been allowed to stand. Large black oil spots are the same only black in color. This is usually, but in no case always, traceable to some carelessness in oiling looms. It is also likely, if on the cloth, to come from the cloth room or finishing machinery.

To aid in locating the possible source of the fault I would most certainly distinguish between oil on the cloth and oil on the warp. In some cases oil on warp may possibly be traced to the slashers.

Oily Filling. A clear solid stripe of oil on the filling, either black or yellow, is almost always caused from the spinning or card room. In most cases it is laid to the spinning room.

Dirty Filling. Filling that has been dropped on the

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floor is dirty usually on one end or one side. This causes a spotted appearance and usually a wider stripe than oily filling and in no case so solid. (Looks like "music" if you please.) It is commonly laid to carelessness in the weave room.

Oily Warp Threads. Black or yellow threads running in the warp. Very common in new mills, or mills recently overhauled. Commonly laid to the spinning room, but I believe that, in some cases at least, the card room is at fault.

Now I might carry this description and discussion on and on, but what I have said will be enough to carry my idea to the minds of the readers. At best there is something around every mill that would require special treatment in the report blank, for instance, colored mills will require spaces on the report dealing with the mixing of colors, or shades, as will mills on fancy goods require spaces dealing with off patterns. There are many things common to all mills that I have not handled, because, at best, I only intended this to be suggestive, and I want to hear from some others on the subject.

In the "Imperfection Report" form that I offer herewith I also have only been suggestive. If anyone wished to use the idea they would have to elaborate on it to suit their particular needs. I have perforated this report, giving a part to each room. Of course the cloth room is not

THE JOHN DOE COTTON MILL CO.
IMPERFECTION REPORT_____192_.

	IMPERFECTIONS	LOOM NO.	YDS. 2NDS.	LOOM NO.	YDS. 2NDS.	LOOM NO.	YDS. 2NDS.	LOOM NO.	YDS. 2NDS.	TOTAL SECONDS
WEAVE ROOM	THIN PLACES									
	FLOATS									
	THREADS OUT									
	DROPPED THREAD									
	HANGING THREAD									
	LOOSE THREAD									
	ROPE FILLING									
	SNUBBY FILLING									
	TAG FILLING									
	SCRATCH UPS									
	YELLOW OIL SPATTER									
	BLACK OIL SPATTER									
	OILY FILLING									
	DIRTY FILLING									
SPINNING	TAG FILLING									
	SNUBBY FILL.									
	OILY FILLING									
CARDING	DOUBLE ROVING									
	SINGLE ROVING									
SLASHING	HARD SIZE									
	SLASHER STAIN									
	TOTAL YDS. 2NDS.									

always competent to place the blame in such matters. My idea is to have this report go first to the superintendent, and if there is any error in placing the blame, then he can easily change the report or instruct the cloth room as to such changes as he desires. I believe this idea alone is valuable, as if anyone is being blamed as he thinks wrongly, he will kick, and if the superintendent is not already on the job as he sometimes is not, he will soon get on it.

I shall be glad to hear from someone else on any phase of this rambling article, for of course I do not know it all and am sure that a better understanding of cloth defects and a better classification of them will certainly lead to much good. If anyone has a better term than I have offered, shoot it. If anyone can suggest a better way of reporting and handling imperfections from a cloth room standpoint, also please say so, and if anyone thinks my ideas are good I shall be glad to know of it.

The report blank submitted herewith is only intended to be suggestive at best, only a very few imperfections, no doubt not all that should be reported in even the coarsest mill, are detailed here. It would have to be enlarged to suit the needs of the individual mill. It repeats some of the listings of the weave room in spinning; this is to allow placing the blame in either place, as may be necessary. I would carry this further and add even another space to report seconds made in the cloth room, for there is, without question, seconds made in this department.

In using this blank, write the loom number in its proper space whether there were any seconds made or not; where seconds were made, put the yards of seconds in the column so marked; then by adding across before turning in this report one could easily see how much seconds were being made from each particular defect, and by adding down the totals the amount for the half day would be shown, for I certainly would turn this report in twice a day.

The question now arises, "Where would you make up this report?" I would have the "graders" behind the folders, or wherever the grading is done, make up these reports as they cut the cloth. If more than one grader is used, then have more than one report.

In large mills where they were having trouble with some particular defect, such as thin places, it might and no doubt would be necessary to give more lines, say three or four double lines, instead of two as outlined.

The perforations are so that the superintendent may easily separate the reports and send it to each department at once as received. T. T. C. (N. C.)

Adjusting an Electric Stop Motion.

EDITOR COTTON:

Many a man has lost his temper because he could not find the real trouble of a machine out of order, and nine times out of ten, he himself is to blame.

The other dav I saw an overseer trying to fix the magneto box on an electric drawing frame. He thought the trouble was due to a weak current. First he set the finger closer to the revolving clutch. This was wrong because the frame knocked off continuously. Next he tightened all the parts connected with the magneto box. In fact he tried everything except the right thing.

It seems this frame had been giving trouble for some time, the chief trouble being the ends running out at the back would run through the drawing rolls before the frame would stop, thus causing a large amount of light work in front that had to be removed in each case.

Finally the overseer turned to me and said, "These drawing frames are all shot, and no one can do any better." No doubt many readers have heard this same remark very often.

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The trouble in this case was due to the magneto being set too far away from the hanging finger. I loosened the magneto and set it to ⅛ of an inch from the hanging finger, this change made the mechanical stopping arrangement just as sensitive if not more so than on the rest of the drawing frame.

This is nothing new to most practical men, but it should be a good point for those not efficient on electric stop motion frames. Wash (Mass.).

Static and Its Control.

EDITOR COTTON:

Electricity is an invisible agent or force which is chiefly known by the effect which it produces and by various manifestations which we call electrical. Just what it is no man knows, but by years of scientific study and experimenting we have arrived at the point where it is possible to say that to a certain extent we are able to control it. However, it is something which cannot be destroyed, for certain sources in nature itself are apparently inexhaustible. What has come to be considered one of the greatest scientific discoveries of the nineteenth century was made by Maxwell in which he demonstrated that light itself is no more than electro-magnetic waves.

Electricity at rest is known as static electricity and it may seem strange, but a material to become charged with static does not have to be a conductor of electricity. A glass rod or piece of gutta percha may become charged with static and yet they are known as insulators or as non-conductors of electricity. Cotton is only a partial conductor of electricity and yet we all know that it can become charged with electricity to the extent that it becomes at times, under certain conditions, practically impossible to carry the fiber through the manufacturing processes.

Static electricity has entirely different properties from electricity in motion, known as current. When electricity is in circular or whirling motion it is known as magnetism. When in a state of rapid vibration it is called waves.

It is static electricity which affects the cotton fiber. It is current which lights the incandescent lamp. It is magnetism which causes the horse shoe magnets nearly every boy possesses to pick up needles, pins, nails or any other conductor of electricity. The space between the ends of the horse shoe magnet is called a "field" and there are constantly passing through this field lines of electric-magnetic force which then pass back through the loop and around again giving the circular motion. When these lines are cut by a revolving body placed between the ends or poles of the magnet, a current is generated which may be carried away and used to light the incandescent lamp. This is the theory, expressed in the simplest terms, of the generator. Everyone is familiar with the wireless telephone. The message is picked out of the air by the antenna but it is electrical waves which first strike the antenna and are then passed through various stages of change until we are able to hear the spoken word, reproduced through the ear phone.

Electricity or electrification may be produced in many different ways. Among the most common are friction, chemical action, compression, and, if an object is not electrified, it may be made so by one that is, simply by contact. When an object is electrified it is said to be charged.

To the writer's mind, the only source of electrification of the cotton fiber is from frictional static. The production of this static causes the fibers themselves to become electrified and the biggest cause is due to the friction of the fibers on one another and on various parts of the machine on which the fibers are being worked. Belts may contribute some to this electrification, but the largest percentage comes from fiber friction.

The drawing frame causes the most fiber friction due to its action, and probably more trouble is found on this machine than on any other. The cotton sliver when under influence of static is attracted to other objects which themselves show no signs of electrification. This may be noticed when the sliver clings to the sides of the cans on drawing frames and refuses to drop and coil as it should.

There are two forms of static produced by friction, and both are always present and of equal value. They are known as positive and negative electricity and exhibit two characteristics known as attraction and repulsion. As far as the control of static is concerned the fact that it is positive or negative makes no difference. However, attraction and repulsion depend upon whether the static be positive or negative or both.

Briefly stated, attraction is exhibited when two bodies become charged, one with positive and the other with negative. Under such conditions, the two bodies are attracted to each other. Two bodies when charged each with positive or each with negative electricity are repelled from each other. This explains the reason why the web clings to the card doffer (attraction) and why a strand of yarn or roving will be "fuzzy" or "beardy" (repulsion).

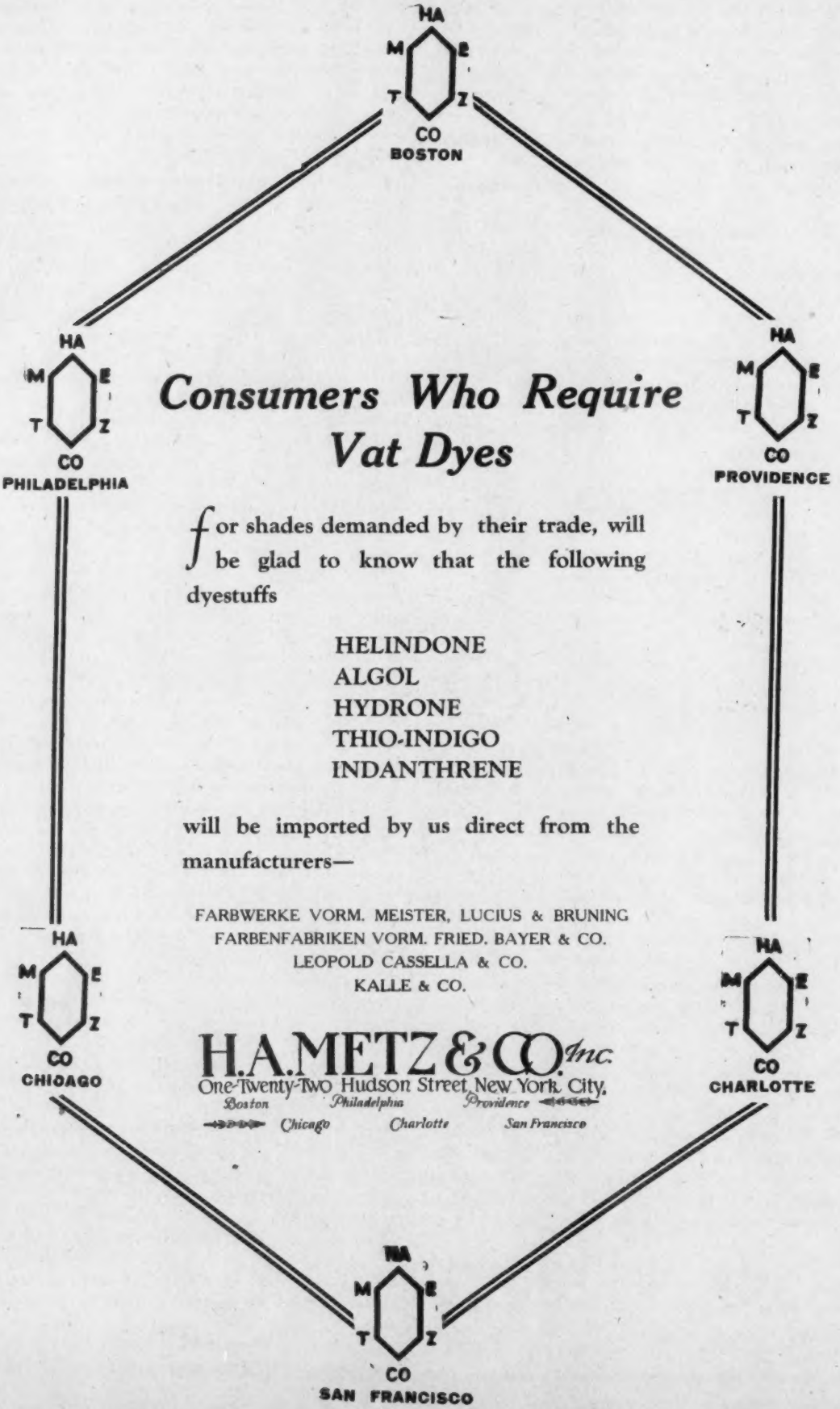
The earliest experiments in the production of electricity by friction noted several characteristic manifestations. When a *dry* glass rod was rubbed briskly with a *dry* piece of silk, the glass rod and silk both became charged and both has the power to attract to them bodies not electrified. This is the manifestation of attraction at work.

But after such non-electrified bodies had been in contact with the glass rod or silk a certain length of time, they absorbed some of the electricity from the glass or silk and themselves became electrified through contact, but with the same kind as the glass or silk. When this occurred the glass and silk no longer had any attraction for such bodies charged from themselves and repelled them. This was the manifestation of repulsion.

It was also noted that when an object was electrified by contact with the silk and then repelled by the silk, it was attracted to the glass rod and also objects once repelled from the glass rod were attracted to the silk. This proved the deductions. Anyone may try this with a glass rod, silk and small pieces of paper.

Static also exhibits the property, under certain conditions, of absorbing electricity from an outside source, of the proper kind and amount to exactly neutralize itself and will become non-electrified. This property forms the basis upon which the electric neutralizer works. But these experimenters also determined upon one fact that is to the cotton mill man what the lighthouse is to the sailor: That is, that when moisture is present the electrical manifestations explained could not be produced. There was no static. In other words, moisture prevents the formation of static.

Probably many carders who run dyed or bleached stocks have been unable to get the webs off the doffers and have



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sprinkled water on the lap entering the feed rolls. No other condition has been changed. They have noted an immediate improvement. This is due to the lap carrying moisture into the card and, while there, preventing the formation of static. But the cure is only temporary for the moisture soon passes off and static again is formed. And it (the water) is hard on the card. But if moisture could be constantly present the static would never form.

One of the writers in COTTON recently said he thought static from chemical action in the dye bath or bleaching process might be carried along by the fibers into the manufacturing processes and be the reason why some dyed stocks might be more susceptible to static than raw stocks or other dyed stocks.

I do not believe such a condition as this exists.

Dyed and bleached stocks both lose the natural oil and waxy coverings of the fibers. The process leaves the fibers more or less harsh and brittle and this fact alone, in the writer's judgment, renders such stocks stronger in those properties which produce static. Again, the fibers are usually dried and contain no natural moisture. I have run some colors that even in a humid atmosphere would still make static and could not be run until they had been washed in a bath of common salt and water. The salt bath makes the fibers take up moisture quicker and more freely.

There are three methods by which static may be controlled, viz., grounding, neutralization, and moisture.

There is absolutely no doubt that grounding will carry away static. When a machine is grounded, by means of a wire, to the sprinkler or water system, it will carry away the static or else there will be no static for it to carry off.

I have taken a single card and grounded the driving belt and the card frame at four places to the sprinkler system and still the web would ride over the comb back onto the doffer. I have grounded drawing frames in the same way and could see no improvement.

I therefore feel safe in saying that static which can be carried away such as generated by belts, etc., is not the static that gives the carder and spinner trouble. It is the electricity with which the fiber itself is charged that makes all the trouble *and that cannot be grounded.* I have also seen conditions of 75 per cent humidity in temperature of 72 degrees in a room containing 150 cards, and you could not get a spark from a belt. This card sliver was trucked to a set of drawing frames in another mill where there were no humidifiers and the relative humidity could not be obtained. Here you could get a good spark from any belt in the room and yet the drawing frames gave no trouble on account of static except the first thing in the morning.

However, I have in mind a cloth measuring machine built with a wooden frame and driven by a belt from a motor that was mounted on the frame of the machine itself. The driving belt passed through a shipping fork. The shipping fork was carried on a roll supported by brackets which were bolted to the bed of a hand operated knife just in front of the measuring rolls. The machine measured and wound cuts of 60 yards. The operator, who was also an inspector, used the knife to cut the cloth when the machine automatically stopped after measuring 60 yards.

We started up this machine one afternoon and it worked fine. The next morning (it was in January) the operator started the motor, stepped on the starting pedal, 60 yards were measured and wound, the machine stopped and the operator took hold of a knife handle and then uttered a shriek that brought everybody running. She told me that something hit her arm and gave it an awful twist. So I tried it myself and got the worst "kick" of static that I have ever received. Yet it wasn't there the afternoon before. And after the kick you could hold the knife handle indefinitely and feel nothing, but once let go and then take hold again and you got it again.

We grounded the knife bed to the sprinkler pipe and had no more trouble, but that girl never would run that machine again. In such case as this grounding is absolutely necessary.

The second method of controlling static, namely, neutralization, works on the principle of rendering the static neutral after it forms and before any damage is done. This depends upon the characteristic of static by which it will of itself select, from a properly arranged outside source, a charge of the proper kind and amount to exactly neutralize itself. This outside source is such as will supply either positive or negative and the static in the fibers will take up its opposite kind and of an amount to neutralize itself. This takes place in a very small fraction of time and is practically instantaneous and continuous in operation.

The method briefly described is to suspend near the surface of the card doffer, drawing rolls, etc., a bar containing a number of points from which an alternating current of very high voltage and low amperage is thrown onto the fibers or sliver. Whatever static may be present immediately takes up from this source an amount and the right kind of electricity to exactly neutralize itself causing the fibers to lay straight and act in a "dignified and orderly manner."

Fibers so neutralized are not immune to static and will again become electrified and must again be neutralized.

The machine for this work is a commercial electric neutralizer. The writer has worked on them and knows that for overcoming static there is nothing that can do any more than it does, for it absolutely neutralizes static even under the most favorable conditions for its production.

The third method for controlling static is by means of moisture. The formation of static is greatly hindered and absolutely prevented under proper conditions when moisture is present, or as commonly called—humidity.

When air contains or carries moisture or water, it is said to be humid, or has a certain humidity. Air is very hydroscopic, or, in other words, has the ability to readily absorb and carry water. When air is absolutely dry, it carries no moisture whatever and at that time resembles a sponge in its ability to absorb water.

The amount of moisture which air can carry or hold depends upon its temperature alone. The higher the temperature the more moisture it is capable of holding. There is, however, a limit to the amount of moisture air can carry at all temperatures. Such limit is called the point of saturation. When air reaches this point it is carrying its limit of moisture. It can hold no more. It is just like a bowl full of water which will run over and spill if more be added. Now if more moisture be added to saturated air or if the temperature of the air be reduced, (thereby reducing its capacity to hold water) then there will be a precipitation of water. This in nature is the cause of rain.

It therefore becomes necessary to have some means of measuring and regulating the amount of moisture and also some way of designating these different conditions. Thus

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we use two terms in measuring the amount of moisture in air, namely—absolute humidity and relative humidity.

Absolute humidity is the amount of moisture air actually carries at any temperature, expressed in grains per cubic foot. Thus air at 75 degrees temperature which holds four grains of moisture per cubic foot is said to have an absolute humidity of four grains per cubic foot. Air at 75 degrees temperature at the point of saturation will hold 9.4 grains of water per cubic foot. If the temperature of the air be increased to 80 degrees, the point of saturation will not be reached until a cubic foot of air contains 11 grains of moisture. In other words, if the temperature of air be raised from 75 to 80 degrees its ability to absorb water will be increased from 9.4 grains to 11 grains. From this it may be seen that the ability of air to absorb moisture is almost directly proportional to its temperature.

Relative humidity is the amount of moisture that a cubic foot of air at a certain temperature actually holds, as compared with the amount of moisture a cubic foot of air at the same temperature would hold without precipitation.

Relative humidity is therefore the degree of saturation and is expressed as a certain percentage. It is possible for air at any temperature to have a relative humidity of from 0 to 100 per cent. At 0 per cent relative humidity it would be absolutely dry, and at 100 per cent relative humidity it would be at the point of saturation.

Air at 75 degrees temperature and having an absolute humidity of 9.4 grains per cubic foot would have a relative humidity of 100 per cent because the percentage of moisture it actually holds in relation to what it would hold at the point of saturation is 100 per cent.

Air at 75 degrees temperature and having an absolute humidity of 4 grains per cubic foot has a relative humidity of 42.5 per cent because at a temperature of 75 degrees air will carry 9.4 grains of moisture before precipitation takes place and 4 is 42.5 per cent of 9.4. Therefore the relative humidity is 42.5 per cent.

Air at 75 degrees having an absolute humidity of 7 grains per cubic foot has in the same way as above 74.4 per cent relative humidity, or it is 74.4 per cent saturated. If the temperature of this air should be raised to 80 degrees and the absolute humidity remain at 7 grains per cubic foot, the result expressed in terms of relative humidity would be as follows:

Air at 80 degrees will hold 11 grains of moisture per cubic foot. When holding only 7 grains it is 7/11 saturated and the relative humidity would be 63.6 per cent. Therefore, an increase in room temperature will reduce the relative humidity unless the absolute humidity be increased in proportion. (Remember this fact for I shall call it up again later.)

Air at 75 degrees temperature and having an absolute humidity of 7 grains per cubic foot is, therefore, more humid than air at 80 degrees with the same absolute humidity. Air at 80 degrees would have to have an absolute humidity of 8.3 grains per cubic foot to have the same relative humidity as air at 75 degrees with an absolute humidity of 7 grains per cubic foot.

In the control of static it is the moist air that gives the results. The more moist the air up to a certain point, the better the conditions. It is, therefore, the degree of humidity or relative humidity with which we are interested in the control of static rather than the absolute humidity.

I might say that the condition which gives the greater relative humidity would be the better for the prevention of static. For instance, air at 70 degrees temperature carrying about 6.0 grains of moisture per cubic foot has a relative humidity of about 74 per cent. Air at 80 degrees temperature carrying 7.0 grains of moisture per cubic foot has a relative humidity of only 63.6 per cent. Therefore, air at 70 degrees with only 6 grains of moisture per cubic foot would be better than air at 80 degrees with 7 grains per cubic foot.

It would be impossible to spend the time and effort to measure the amount of moisture in grains per cubic foot that air contains in the cotton mill. In order to facilitate this operation and quickly arrive at the relative humidity an instrument is used called a hygrometer. To determine the relative humidity with the hygrometer a set of hygrometrical tables are necessary.

The ordinary mill hygrometer is an instrument composed of two ordinary thermometers of good degree of accuracy held in a suitable case or frame and exposed to the air of the room. They are usually hung on a post at some central point.

One of the two thermometers is absolutely plain and is simply affected by the room temperature. This is known as the dry thermometer.

The other thermometer is known as the wet thermometer. This is because the bulb is covered with a wicking which leads from a small vessel filled with water.

The theory is that the air will absorb moisture, the rate being dependent upon the amount of moisture the air actually carries in relation to what it could carry, or in other words, upon the relative humidity.

The water from the wick is, therefore, evaporated into the air constantly, the rate of evaporation depending on the relative humidity.

Evaporation is always accompanied by a reduction in temperature. The faster the rate of evaporation, the lower the temperature. Thus, when the relative humidity is low, the water in the wick will evaporate faster, causing a lowered temperature of the wick, which, being around the bulb of the wet thermometer, causes the wet thermometer to read lower than the dry. As the humidity increases the reading of the wet gradually approaches the reading of the dry. When the reading of both are the same then there is no evaporation taking place. The air must be saturated and so the relative humidity will be 100 per cent.

It is the difference in readings between the wet and dry thermometer that is used with the tables to determine the relative humidity.

For instance, with the dry reading 75 degrees and the wet 56 degrees, the relative humidity will be 31 per cent. With the dry at 75 degrees and the wet at 65 degrees, the relative humidity will be 55 aer cent. With dry at 75 degrees and wet at 70 degrees, relative humidity will be 74 per cent. With dry and wet both reading 75 degrees, the relative humidity will be 100 per cent.

Where natural conditions are such that static easily forms, it becomes necessary to artificially moisten the air. For this purpose there are many types of humidifiers, all of which cause a fine spray of water to be so governed that the air will quickly and readily absorb it.

There are two general methods of humidifying and conditioning air.

The first may be properly called an air conditioning

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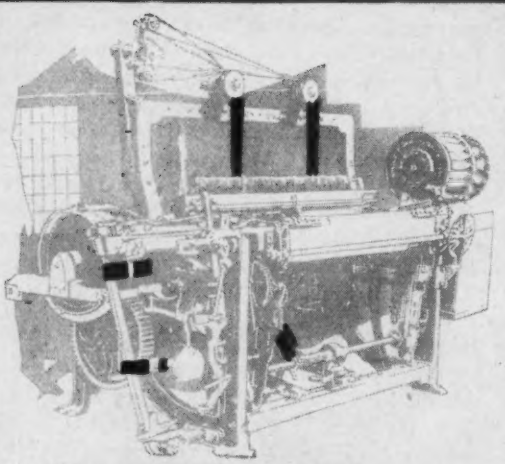

CHARLES Bond COMPANY

LEATHER IMPORTERS, CURRIERS AND BELT MANUFACTURERS
617 619 Arch St. Philadelphia, Pa.

Bondaron
TEXTILE LEATHERS

Cut Your Loom Leather Costs in Half

Textile leathers are small items individually, but when you add up the costs of all leathers used for the past several years, the items amount to a pretty good sized bill. Add to this cost the time lost from stoppages and replacement of straps and the like, the cost of picker stick breakage on account of poor lugs, and the item will still be somewhat larger.

Thorough tests have shown that "Bondaron" Leathers last from three to five times as long as other leathers on the market. You can at least cut your loom leather costs in half with "Bondaron" products. The secret of their long life and incomparable service is superior quality hides tanned by a well guarded special process which adds greatly to the tensile strength, pliability and general serviceability.

It means REAL ECONOMY to standardize on "Bondaron" for all textile leather requirements.

LEATHER

BONDARON

apparatus. It consists of a central unit of one or more sections in which the air is heated, moistened and constantly changed to meet the various conditions of each room. After passing through this process the air is conducted to the various rooms through pipes.

The second method is a direct humidification only, there being no attempt made to heat or otherwise treat the air. For this purpose so-called humidifying heads are used. There are many different kinds and designs, but all reach the same end in that they throw into the atmosphere a fine spray of water depending upon the air to absorb it.

There are also in use various forms of vapor pots and steam pipes, more or less home-made affairs, which for want of anything better, have been very useful in overcoming static. But any system which blows raw steam into the room has many disadvantages, chief among which is that it works to defeat its purpose by increasing the room temperature.

As explained, an increase in room temperature, caused by the steam entering the atmosphere, and as well as carrying water also carry heat units, means that more moisture must be used to maintain the relative humidity.

We all know that each room of a cotton mill works best under a certain temperature. At this temperature a certain relative humidity will be found to be the best. Therefore, an increase of temperature with the corresponding increase in moisture needed to maintain the relative humidity is a needless expense. Humidification by steam vapor is also much harder to control for, through its action as explained, it tends to make conditions very uneven. But it is better than nothing.

The ideal humidifying apparatus is one which will maintain the proper conditions of humidity without changing the room temperature. This is accomplished by using water which is of the same or a little higher temperature than the room temperature. The absorption of water by the air is of course an evaporative operation and therefore will slightly reduce the air temperature. By using water of slightly higher temperature we tend to overcome the tendency to lower the room temperature.

Cotton naturally contains about 7 to 12 per cent of moisture. In manufacturing processes this moisture is thrown off. Whatever is thrown off means a loss for it must be replaced by fiber to maintain weight. I do not mean this in a way that mills should attempt to sell moisture rather than fiber, but the sale of yarns with normal moisture content is perfectly legitimate, and will make better, stronger and evener yarns.

The breaking strengths of yarns have been increased from 10 to 15 per cent with the installation of proper humidifying apparatus, to the writer's own personal knowledge.

On speeders better roving is made. It is more free of bunches and will take the twist better. And I have known speeders to be run with slacker twist under proper conditions of humidity.

I have sometimes wondered if some of the men who have written COTTON of their troubles in making roving, the use of a high twist multiplier, and a low breaking strength on their yarns, would not find a large part of their troubles eliminated under proper atmospheric conditions.

For though our New England climate may be "all weather," as "Wash" intimates, still, some of us have made pretty good climate artificially. S. A. F. (R. I.)

An Old Timer Says—

(*Continued from page* 867.)

If it were possible for me to show you my files, you would be amazed at the number of inquiries for superintendents I could show you. But, you say, why in the name of Tom Thumb don't they hire some of us overseers? Well, I will now try to tell you a few reasons "why," and if you want to know more than I am able to set down in the space allotted to me this month, drop the Editor of COTTON a line and he will probably grant me space for more about this later on, or if you have some special question to ask, it will be answered without divulging your name or location.

After getting full control of your selfishness, suppose you begin to look around a little and see if there is not something you can improve on. Here is a solemn fact:

No human process can stand the test of intelligent study without showing improvement.

That means that your job is not perfect, no matter how much production you are getting or how low your cost is. It also emphatically means that *you* are not perfect. But do not be discouraged, because it also says that by intelligent study you will be rewarded with improvement. Here are a few suggestions to give you a start:

Always do the very best you can under the circumstances. If you can't find ways to get more production, make it better; start a campaign among your section men and operatives, to educate them into thinking the things you have to think, what it means to have cooperation, etc. Plan ahead. Don't wait until you are short of help. Are you managing your help in such a way that you can hold the same discipline when you are short?

Ask yourself: What would I do in this department if I were superintendent? If you are going to be a superintendent, why not practice some in your own room? Oh, yes, there are plenty of things you can do without stepping out of your position as overseer. And you need not be afraid you will help the superintendent, because you have decided to never show that selfish disposition again.

It is the overseer who can see chances of improvement and who is willing to put his shoulder to the wheel who will, in time, come out from the crowd and stand apart from the crowd while the crowd wonders why some of them didn't get the job.

Most all overseers know they could run the job better than the superintendent, and those overseers who do think that way probably don't realize that *his* own second hand knows *he* is running that room and the overseer is merely drawing a pension.

Ever think about it that way?

Who issues orders for supplies? Does he examine the old or broken piece to see if it has a good set screw, a bolt or an assembled piece which is not broken? The "kick" here is that supplies cost money—yes, any fool knows that—but just to satisfy yourself that you are no fool suppose we step down to the scrap pile and have a look.

It is better to "kick" than to be "kicked," but for goodness sake don't be a chronic "kicker."

Vapor

The Destroyer in the Dye Room

The greatest waste in the dye room is caused by vapor and condensation. It is injurious alike to the health of the men and to product, machinery and wood-work. It is not a necessary evil, neither does it require expensive equipment to eliminate. The Buckeye system is proving a profitable investment in other mills—why not yours? It is scientific and efficient. Our engineers handle the job complete, from plans to installation. Satisfaction is assured.

You will be under no obligation by requesting our representative to call and investigate your requirements. Write or wire today.

BUCKEYE BLOWER CO., COLUMBUS, OHIO
Southern Representative, 372 Whitehall Street, Atlanta, Ga.

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SYSTEM FOR DYE HOUSES

Blowers and Heating Systems for Cooling, Heating, Drying, Ventilating and Conveying.

THE SAME set of loom harness makes any cloth when you weave with

"DUPLEX" FLAT STEEL LOOM HARNESS

STEEL HEDDLE MFG. CO.

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509 Masonic Temple Greenville, S. C.

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N. B.—We are the sole manufacturers of nickel-plated drop wires for every kind of loom.

Cloth Weight Calculations.

EDITOR COTTON:

The following questions have caused considerable discussion here, and we would appreciate seeing in your "How Other Men Manage" Department some answers to them from your subscribers.

1. A fabric weighs 1.10 yards to the pound; costs 35 cents a yard. How much is the cost per pound? What is the weight per square yard? What is the weight of one linear yard if the fabric is 40 inches wide? Please show results and simplest method of getting same.

2. A fabric weighing 7¾ ounces to the square yard costs 30 cents a yard. What is the weight of one linear yard if the fabric is 40 inches wide? What is the price of one yard of the 40-inch fabric? What is the price per pound? Please show simplest method. P. D. (Colo.)

EDITOR COTTON:

In relation to the questions raised by "P. D. (Colo.)" I would submit the following explanation:

It is customary to designate the weight of cotton fabrics as so many yards per pound. These are lineal yards and not square yards. It is, therefore, possible to designate a fabric 30 inches wide and one 40 inches wide as weighing 6 yards per pound. The only difference, as far as weight goes, would be in the weight per square yard.

Specifications for cotton fabrics usually read that a fabric should be of a certain width finished, shall weigh so many yards per pound and shall have so many threads of warp per inch and so many threads of filling per inch.

In question 1, "P. D." neglected to give the actual width of the fabric so I shall assume that the actual width is 40 inches.

This fabric weighs 1.10 yards per pound and is valued at 35 cents per yard. As there are 1.10 yards per pound the cost per pound would be found by multiplying 35 cents by 1.10, or \$0.35 × 1.10 = \$0.385 or 38½ cents per pound.

As 1.10 lineal yards weigh one pound or 16 ounces, then one lineal yard would weigh as many ounces as 1.10 is contained in 16:

16 ÷ 1.10 = 14.54 ounces per yard.

(This answers the question in regard to the weight per lineal yard if the fabric is 40 inches wide, for if 1.10 yards weigh one pound then one yard will weigh 14.54 ounces irrespective of the width.)

Assuming that the fabric is 40 inches wide, then a piece 40 inches wide and 36 inches long will weigh 14.54 ounces. (As found above.)

A piece 36 inches wide and 36 inches long (1 square yard) will then weigh 36/40 of 14.54 ounces;

36/40 × 14.54 = 13.086 ounces weight of one square yard.

Question 2. "P. D." states that this fabric costs 30 cents per yard. I am going to assume that he means 30 cents per lineal yard.

As this fabric weighs 7.75 ounces per square yard (36 inches by 36 inches) then a piece 36 inches long and 40 inches wide will weigh 40/36 of 7.75 ounces; 40/36 × 7.75 = 8.61 ounces weight per lineal yard, 40 inches wide.

If "P. D." means that this fabric costs 30 cents per lineal yard, then the price of the fabric will be 30 cents per lineal yard whatever the width may be.

As a piece of this fabric 36 inches long and 40 inches wide weighs 8.61 ounces, there will be as many yards (or 36-inch lengths) in one pound (or 16 ounces) as 8.61 is contained in 16:

16 ÷ 8.61 = 1.858 yards per pound.

As one yard costs 30 cents then one pound will cost 1.858 × 30 cents = 55.74 cents.

Putting this into one equation the cost per pound would be

$$\frac{16}{8.61} \times \$0.30 = \$0.5574 \text{ or } 55.74 \text{ cents per pound.}$$

Now it is possible that "P. D." may mean that the fabric in question 2 costs 30 cents a square yard. If so, then his question would be answered as follows:

The weight per lineal yard would be 8.61 ounces for a 40-inch fabric as in the former solution.

The cost per lineal yard of the 40-inch fabric would be as follows:

A piece 36 inches by 36 inches costs 30 cents. A piece 36 inches by 40 inches would cost 40/36 of 30 cents:

40/36 × \$0.30 = \$0.3333 or 33⅓ cents per lineal yard.

As we found above that there was 1.858 yards in one pound of this 40-inch fabric, then the cost per pound would be

1.858 × 33⅓ cents = 61.93 cents per pound.

If the foregoing explanation is not satisfactory I will gladly reply to any further questions "P. D." may ask, but would ask him to be as clear as possible in his questions and to supply all the information necessary to make a satisfactory answer. S. A. F. (R. I.)

Figuring Draft and Keeping Numbers.

EDITOR COTTON:

I recently received a letter from a young man who had just been made superintendent of a small mill asking me to figure out his drafts and give him some information about keeping his numbers running regularly so that he would have the minimum amount of changing to do.

The calculations are very simple, but the fact that one man has asked for them prompts me to think probably other young men would be interested, therefore I am passing the information along to you for publication if you think it worth while.

His letter in part is as follows: "Will you please figure out my drafts at each process for me and send me all the figures so that I can see how you arrive at them? Will you also explain to me what you think is the best method or system of keeping numbers. That is, when the yarn goes heavy do you have the carder change or do you try to keep the roving at a standard weight?

"I am using 1-inch cotton and am running an 11-ounce lap, 48-grain card sliver, 53-grain first drawing, 55-grain second drawing, .74-hank slubbing, 2.10-hank intermediate roving, and 7.30-hank filling roving and 5.65-hank warp roving; 30s warp yarn and 40s filling."

My answer was as follows: There are several ways of making the calculations for drafts, but believing the following method very easy to understand I proceed this way:

Begin with an 11-ounce per yard picker lap. As the card sliver is expressed in grains we want to reduce the 11-ounce lap to grains. There are 437½ grains to the

The above shows a RA-TOX shade installation in the Wm. Ziock Paper Box Co., Rockford, Ill.

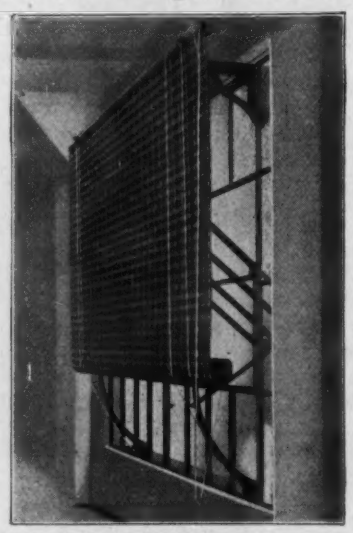
Light without Glare Pure Air without Draft

Does your factory have an east, west or southern exposure where at certain times of the day it is subjected to a terrific sun glare and heat? Shade those areas and give your workmen a chance to work at their greatest efficiency. Light and pure air are both essential, but they should not be secured at the cost of distressing glare and dangerous drafts. The shade you want is one that allows the light to penetrate and the air to flow through gently.

RA-TOX

Gives 30 to 40% More Light and Air

The construction of RA-TOX Shades makes them almost indestructible and still they cost no more than ordinary shades. By a patented process they are attached directly to the steel sash without the need of costly and troublesome boring of steel or drilling concrete. Guided around the center swing ventilator by means of specially designed fixtures, RA-TOX Shades are brought back flush against the factory wall, out of the way of machinery or workmen.



What are your window specifications? Write for price quotations and full descriptive literature.

HOUGH SHADE CORPORATION

Industrial Shade Division

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Utsman Quill Cleaning Machines are cutting operating costs in hundreds of mills in this country and Canada. Utsman Machines, installed five years ago, are today giving reliable cost-cutting service.

Save Labor Cost

Depending upon individual mill conditions, Utsman Quill Cleaning Machines have reduced the number of laborers anywhere from four to twelve people. One operator can do the same amount as five or six operators can clean by hand.

Save Quill Cost

Rapid quill cleaning allows a mill to operate with less quills. Utsman Machines also save on quill cost as they do not damage quills to the extent that hand cleaning damages them.

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By efficient, rapid cleaning of quills, Utsman Machines prevent the holding up of other mill departments by causing them to wait as they oftentimes must wait on slow, hand quill cleaning.

Low Upkeep Cost

The practicability and high efficiency of Utsman Quill Cleaning Machines are largely the direct results of their simplicity of construction. Simple, sturdy construction and ease of operation make the Utsman Quill Cleaning Machines easy to keep in first-class running order and low in repair cost.

Free Engineering Service

Upon your request, our Engineering Department will advise you whether or not an Utsman Quill Cleaning Machine will cut your quill cleaning cost. Your inquiry will be given prompt attention. Consultation does not in any way obligate you.

Every machine, trade-marked "TERMACO," is sold under a binding guarantee as to workmanship, material and operation.

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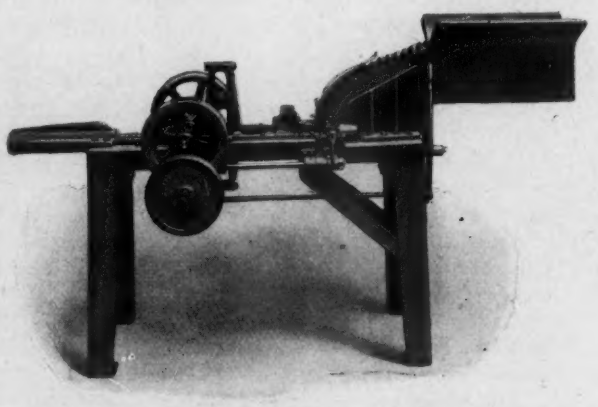

Single-End UTSMAN bobbin cleaning machine. Either equipped for clutch as shown, or motor drive. About 40,000 feeler bobbins, daily capacity.

ounce, so, $437\frac{1}{2} \times 11 = 4812$ grains per yard of lap going into the card. 48-grain sliver coming out of the card. To get the draft we divide the grains going in by the grains coming out, thus

$$\frac{4812}{48} = 100.25 \text{ draft of card, or 100 draft.}$$

A 48-grain card sliver going into the first drawing is doubled six times and delivering a 53-grain sliver; therefore

$$\frac{48 \times 6}{53} = 5.43 \text{ draft of first drawing.}$$

A 53-grain sliver, doubled six times, going into the second drawing and a 55-grain sliver coming out of the second drawing gives us

$$\frac{53 \times 6}{55} = 5.78 \text{ draft of second drawing.}$$

Then we have 55 grains from the second drawing going into the slubbers. When you get to the slubbers you weigh 12 yards instead of one yard, so we will multiply the 55-grain weight of one yard of second drawing sliver by 12, which equals 660 grains going into the slubbers.

Your slubber roving weighs 135 grains, which you find out by looking at the table of weights or by dividing .74 into 100 which equals 135. Now with 660 grains going in and 135 grains coming out, we have

$$\frac{660}{135} = 4.88 \text{ draft of slubber.}$$

We now have .74 hank or 135 grain slubber roving doubled going into the intermediates, which is 270 grains, and 2.10 hank roving or 48 grains being delivered, then

$$\frac{270}{48} = 5.62 \text{ draft on intermediates.}$$

Then a 2.10 hank roving or 48 grains doubled going into warp speeders and delivering 5.65 hank roving is $(100 \div 5.65 = 17.7)$ or 17.7 grains, so

$$\frac{48 \times 2}{17.7} = 5.42 \text{ draft on warp speeders.}$$

Again, a 2.10-hank roving or 48 grains doubled going into filling speeders and delivering 7.30 hank roving is $(100 \div 7.30 = 13.6)$ or 13.6 grains, and

$$\frac{48 \times 2}{13.6} = 7.06 \text{ draft on filling speeders.}$$

When we get to the spinning we weigh 120 yards instead of 12 yards which we have been weighing on roving. This is 10 times 12, therefore, we would multiply the grains delivered from the speeders by 10 to get the weight of 120 yards.

A 5.65-hank roving doubled or $17.7 \times 10 \times 2 = 354$ grains going into the warp spinning and delivering 30s yarn. Divide the number of yarn in this case into 1000 and it will give us the grains: $1000 \div 30 = 33.3$ grains delivered, and

$$\frac{354}{33.3} = 10.60 \text{ draft on warp spinning.}$$

A 7.30-hank roving doubled or 272 grains going into the filling spinning and delivering 40s yarn or $(1000 \div 40 = 25)$ 25 grains, will give us

$$\frac{272}{25} = 10.88 \text{ draft of filling spinning.}$$

You, of course, realize that the draft of the machine is greater than that shown by calculating from the weights, on account of the twist and no allowance has been made for waste. A summary of drafts as calculated from the weights at each machine is as follows:

Card	100
1st Drawing	5.43
2nd Drawing	5.78
Slubber	4.88
Intermediate	5.62
Warp Speeder	5.42
Filling Speeder	7.06
Warp Spinning	10.60
Filling Spinning	10.88

In answer to your question about keeping numbers, will say that about the best method or system I know of is to have a standard roving for the card room to make and let them stay on that standard as near as practicable, regardless of dry or wet weather. This will, of course, give you some light roving which is made in real damp weather. That is, the roving made to the standard number during wet weather will have less cotton and more water in it than roving made during dry weather.

When the weather clears up that roving in the spinning room will be too light and you may have to heavy up sometimes, and vice versa. But you do know absolutely what you are working with, while with the way some mills try to keep their numbers you have all weights of roving in your spinning all the time.

Many mills have the carder change his speeders when the yarn goes heavy, even if the roving is not showing very heavy at the time, then as soon as the weather changes, which is oftentimes in only one or two days, the yarn gets about right again, *but they have not told the carder to heavy up* because the yarn is not yet too light.

By the time the roving being made after the carder changed lighter gets to showing up in the spinning, the yarn goes *too* light, and, of course, there are several days' run of roving in the spinning room by that time which causes both the spinner and the carder to change gears. They do not more than get over this change until it all goes too heavy again, especially if the weather also changes to an excess of humidity.

You can readily see that such a system merely results in see-sawing back and forth all the time or most of the time, while if you tell your carder that you want him to make 5.65-hank warp roving and 7.30-hank filling roving, he can watch his laps for any changes when the weather changes and can also hold his drawing, slubbers, intermediates and speeders right on the standard by having crown gears on both sides of the crown gear with which the frame is equipped, that is a few teeth larger and smaller. Under these conditions he will very seldom have to change the draft gears, and I feel confident that your spinner will like this system, because he, too, will have less changing to do.

There certainly is much more satisfaction for carder, spinner and superintendent in such a system, because there

The Schwartz AUTOMATIC ELECTRIC GUIDER

(PATENTED)

FOR STRAIGHT AND SWING TENTER FRAMES

"paid for themselves many times over"

says the Tupelo Cotton Mills, and this is the consensus of opinion among the many users of the Schwartz Automatic Electric Guider.

It will handle cloth of any kind, weight or width —the only guider known for handling fabrics with delicate surfaces, such as velvets, plushes, etc.

It has few parts, is simple, always reliable and requires practically no attention.

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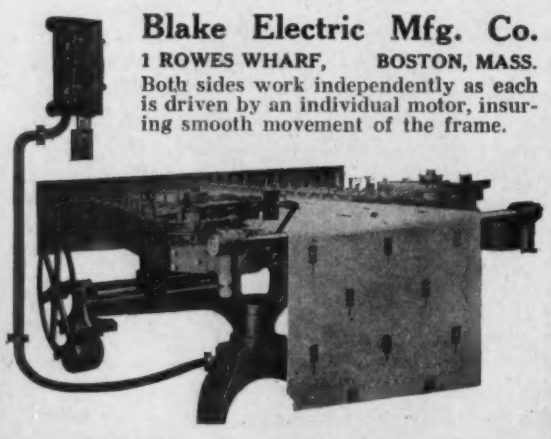
Both sides work independently as each is driven by an individual motor, insuring smooth movement of the frame.



Creo-pine Sub-Flooring

Outlasts the factory but costs no more than any first-class untreated, sub-flooring.

Affords uninterrupted production, eliminates floor repair costs, assures durability and top floor stability.

Creo-pine Sub-Flooring —is vacuum pressure impregnated with pure coal tar creosote oil.

Impervious to all deteriorating influences of rot.

"Timber Penetrated by Creosote Oil Will Never Rot."
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Southern Wood Preserving Co.

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Station A

Manufacturers of Creo-Pine Block Floors for Heavy Traffic Duty

Shingles that Never Rot

Fence Posts Assured Life 25 to 40 Years.

is no grumbling and the men know that they cannot blame something on the other fellow. At any rate it certainly will not tear up your mill to give it a good fair trial of several months, and then if it does not prove a success you can go back to the old system. Contributor No. 74.

What Standards Do You Use and Why?

EDITOR COTTON:

Tables for numbering roving have been adapted for numbering weights in tenths of grains. Also, the twist in all cases is 1.20 times the square root of the number. However, all practical mill men know that the latter is to give an approximate idea to begin with, and the proper turns must be determined by that judgment which is earned by experience.

To my mind, there is no other subject that would prove as instructive and interesting to the readers of COTTON as articles outlining the standards and twist per inch for waste and all grades of raw stock on the slubbers, intermediates, fine and jack frames. Ignorance of these standards has been the reason for many good men losing new positions. For the sake of illustration of what I would like to convey, let us assume that a man was schooled in a print cloth mill, and knew no standards other than the common ones, which are, 1 for the slubbers; 1.1 for the intermediates, and 1.2 for fine frames. Imagine this man taking charge of a fine goods mill where the standard is as low as .50. Or again, picture him taking charge of a waste mill where the standard is often as high as 1.50.

Why not have the readers give their standards in this department and help out the other fellow? The effect on the relationship of flyers and cones that these different standards cause should be pointed out. Also, the effect of the different speeds of the frame.

Wash (Mass.)

Another Letter on Cleanliness.

EDITOR COTTON:

I was very much impressed with the letter by "B. C. A." in the June number on the importance of cleanliness. He is exactly right in regard to some mills that claim to be fine, up-to-date plants and yet they would make one think that they were mills that Noah had in the ark with him and had been running ever since without being cleaned up. There is no reason on earth why these mills could not have the ceilings brushed off once or twice a week, the windows brushed out two or three times a week, fire pails brushed off at the end of the week, the floors scrubbed, walls brushed once or twice a week.

As to the brushing of the ceilings, walls, windows and fire buckets, this can be done very successfully with a broom. All electric light globes should be kept clean, the walls painted or whitewashed and cuspidors placed around the mill and spitting on walls and floors prohibited. A few waste cans should be provided and all oily waste put in these instead of being thrown on the floor. All pulleys overhead should be brushed out twice a week. This can be done very easily by getting a long poplar pole and fastening a broom on one end so a man can stand on the floor and go from one pulley to another.

The help should be instructed to not write on the walls or deface them in any way. A certain time should be had for cleaning the machines, and then the sweeper should come right along behind with his broom or mop. A waste box should be placed in a corner of the room for the sweepings, and care should be taken that they are put in the box and not at the side of it. Toilets should be kept clean and a good disinfectant of some sort used. All drinking fountains ought to be kept clean and neat and all tobacco chews kept out of the sinks.

I am of the same opinion as "B. C. A." I have actually seen mills in such a condition that it was surprising how they kept any help at all—when a little effort on the part of the superintendent and overseers would have put the mills in tip-top condition. B. A. B. (N. C.)

Bobbin-Lead Versus Flyer-Lead.

EDITOR COTTON:

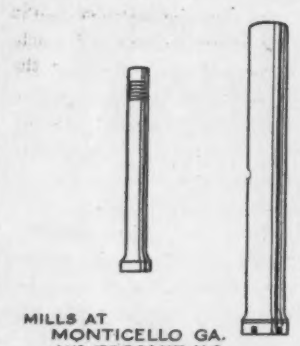
It was with the greatest pleasure that I read the letter entitled "Bobbin-Lead Versus Flyer-Lead," by "K. S. (N. C.)" in the July issue. "K. S." winds up his article by stating that he knows what he is talking about, for he has had thirty years experience in the study and operation of fly frames, and agrees that if what he states is not clear, he will be glad to make it clearer. "K .S." has the right spirit, but, to my mind, he has the wrong dope on fly frames, and it is difficult to me to see how he has clarified the subject in hand.

I fail to see the reason why "K. S." quotes my statements so frequently without an explanation for doing so. For instance, in the second paragraph, he states, "Wash ashed the questions: But is it not a fact that a high speed will make a more compact bobbin which means a slack tension, and is it not also a fact that the firmer grip at the termination of the presser pad, due to high speed, will retain the twist in the strand?" Well, are not these the facts? If they are not, then it was up to "K. S." to point out the real facts, but he did not do so.

In regard to my challenge about the bobbin-lead frame being imperfect, what does "K. S." give us in his letter to prove it otherwise? Next, says "K. S.," "He (Wash) attempts to connect Newton's law of motion with his troubles." "K. S." would, I am sure, have received more credit from the readers had he said "our troubles." But again, "K. S." passes even Newton's law, and does not even attempt to explain its relationship to the presser rod attached to the hollow leg of the flyer.

As regards what "K. S." terms a "flyer test," let me say that he misunderstood the real meaning. It was to prove that the increased pressure would retain the twist to the amount of one tooth, which is a point in favor of the bobbin-lead and flyer of the Dunn type. Evidently "K. S." got the idea that I was a critic from start to finish. When I write an article I always try to give the advantages and disadvantages of machinery or systems, regardless of whom it may displease.

In all the first five paragraphs of his letter, "K. S." only quotes my statements, but does not even attempt to answer my logic. In the sixth paragraph, he is dead wrong when he says "Summing up the foregoing it seems that 'Wash' is of the following opinion: First, that a bobbin-lead fly frame will not do good work." "Wash" is of no such opinion, for I made the following statement,



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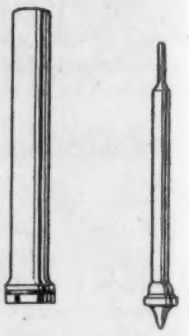

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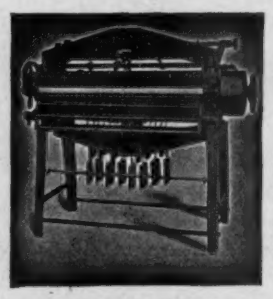

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which appeared in COTTON in 1914, "By using 25 per cent of this higher grade cotton, and strengthening the cross section of the strand, this aided in remedying the unequal condition found on all fly frames. Because by strengthening the cross section of the strand, the pull between the pad and the surface of the bobbin will reduce the diameter of the bobbin instead of stretching the strand, and the relationship between the surface speed of the front roll and bobbin is attained throughout the set."

In other words, and to make my point clear, a bobbin-lead frame will make excellent work when the average length of the staple used exceeds the distance from the point of presshre on the surface of the bobbin to the first wrap on the presser finger. When the staple is short and fluffy, we have our troubles.

Unlike "K. S." I am going to answer every paragraph of his replies to my article. First, most all modern mills are running bobbin-lead flyer frames. They used to run railway heads too, and please be merciful when I say Creighton openers and flyer-lead frames. A good many people use Ford cars, too, but like the bobbin-lead, it has its bumps.

In his second answer "K. S." claims that the primary purpose of the presser pad is not to produce tension nor to keep twist in the strand of roving. However, in the next line he admits that it does make a very slight tension on the strand. Evidently he does not know that there are two tensions on all bobbin-lead fly frames, which I will explain later.

Thirdly, "K. S." declares, "The builders of fly frames discarded the flyer-lead frame for the one purpose of getting rid of the weight of the full bobbin coming against the highest speed of the bottom cone which might cause the cone belt to slip, thereby giving trouble." This is all wrong and is understood to be so by most mill men of the hour. I should like to ask the following questions: Do you not raise the bottom cone on both the bobbin-lead and the flyer-lead frames at doffing time to slacken the ends? When you decrease the speed of the bottom cone on the flyer-lead, do you not increase the speed of the bobbin? On the flyer-lead, is it not a fact that the faster the bottom cone revolves the more revolutions are taken away from the bobbins?

On a flyer-lead frame the speed of the bobbin never equals that of the spindle during the building of the set of roving. Any hesitation of the bottom cone has a tendency to slacken the end, and the slippage of the cone belt will cause slackness. The raising of the cone belt at doffing time to slacken the ends should be proof enough that "K. S.'s" statement is misleading, because when the cone is stopped the bobbin speed is increased in the same proportion as that of the flyer. On the bobbin-lead or flyer-lead frames, when the cone belt slips the ends slacken. If this is not true, let "K. S." explain what happens when the bottom cone is raised at doffing time.

In his fourth reply, "K. S." claims that the make of the flyer, presser pad, or the speed of the frame, have absolutely nothing to do with the outline of the cones in any make of frame. To refute and disprove this statement, I quote the following, which is a part of a letter received from the agent of one of the biggest shops building fly frames. The letter is dated October 2, 1911, and to prove that I am not bluffing, I will mail it to "K. S." if he will give me his address. In part the letter says, "Perhaps rather than to say theoretically correct, one should say before the additional factors of slippage, or difference in tension between the empty and full bobbin due to the slight variation in the pressure of the paddle and the difference in diameter as the bobbin builds up, the other factors are considered and a pair of cones can be figured out correctly by mathematical methods.

"After these mathematically correct cones have been arrived at, several factors including the above have to be reckoned with and the form of cones modified.

"Each of these factors, in part, can be arrived at mathematically, but some, such as the amount of compression in the building up of the bobbin, certainly at least have been checked up, in addition to a mathematical computation. It also follows that variation in speed between one frame and another will require a different cone and that different cottons and different hanks to give a perfect tension will require different cones."

The foregoing is from a man who enjoys the reputation of being an expert on cotton machinery. "K. S." claims that the fly frame is not complicated. I say it is, and I am proving it.

In regard to some of the best mills in this country having interchangeable cones, their mistake does not put "K. S." on the right track.

In conclusion, I would like to ask "K. S." that if by using his own dimensions, given in his fifth answer, if he used a certain hank roving that would require the lateral 36 inches of cone, what would he do in case of an order for banding roving calling for a full bobbin each set, the roving having seven turns to the inch?

What is meant by understanding the relationship between the cones and flyers?

Are there two tensions on all fly frames?

With the Houldsworth compound the bobbin and spindle revolve at the same speed without the additional compounded speed or additional impetus caused from the cone; is the foregoing a simpler proposition as regards the cones than the new so-called differential motion?

The average weight of a full bobbin on fine frames is about 11 ounces. Assuming the top cone to be concave and the bottom one convex, what would be their outline if the pressure of the paddle condensed the strand so 16 ½ ounces is added to the same bobbin?

On all bobbin-lead fly frames, the bobbin of course leads the flyer. Is it not a fact that this excess speed must be driven by the bottom cone and its connections, and is this not a defect?

Those in favor of the bobbin-lead system claim that the pressure of the paddle aids the cone belt, but how can this be so, when the surface velocity of the bobbin must exceed that of the flyer in order to wind the roving?

Again, the strand must be drawn past the end of the paddle where the pressure is so great, that "K. S." himself admits that it condenses the strand; can he or any other reader deny but what there is a great amount of friction at this point, and is it not another defect?

Every carder to a man agrees that no pressure can exist at the termination of the presser pad without rotation of spindle. It is also agreed that when no pressure exists between the presser pad and the surface of the bobbin, that the tension then is from the surface of the bobbin to the drawing rolls. With cones having the true outlines for a certain hank, speed, flyer, or cotton, when the frame is

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run at the precise speed for which the cones were modified, the tension is then between the surface of the bobbin and presser pad. "K. S." says in his ninth paragraph that "the fact that the end goes through the top of the flyer, half around and down through the hollow leg, twice around the finger and through the pad, should convince any practical carder where the majority of tension is put in."

Listen: when you run a fly frame on its lowest speed the ends will run much tighter. This fact is proven more on the slubbing frame, for we all know that on the first layer, if the ends run slack when the rail or carriage is completing its upward traverse, if the speed is reduced the ends will tighten; otherwise a few ends would break here and there. Please let's have no argument on this fact, which also proves that the fly frame is imperfect, and proves there are two tensions controlled by the speed.

"K. S." says he will be glad to make clearer any point that is not fully understood. I hope he will be delighted to make things clearer for us all. We need it.

Wash (Mass.)

The B. P. Mates-Brown Company, 6007 Euclid Ave., Cleveland, Ohio, announce that in expanding their sales policy, they have entered a new field of the textile industry, that of purchasing outright for their own account under agreements from several mills, yarns of all kinds for the knitting and tire trade. This is being done in conjunction with the sales already started as textile selling agents for yarns, equipments, soap, and processing oils.

You of course believe in the slogan that "It pays to advertise." Are you a good advertisement of yourself?

Assistant Marketing Specialist. (Warehousing.)

The United States Civil Service Commission announces an open competitive examination for assistant marketing specialist (warehousing). Vacancies in the Bureau of Agricultural Economics, Department of Agriculture, for duty in Washington, D. C., or in the field, at $1,620 to $2,400 a year, and in positions requiring similar qualifications, will be filled from this examination, unless it is found in the interest of the service to fill any vacancy by reinstatement, transfer, or promotion.

On account of the needs of the service applications will be received until further notice. Papers will be rated as received and certification made as the needs of the service require. Persons thoroughly acquainted with the commercial grades of cotton warehousing of cotton are urged to enter this examination, as the opportunities for appointment are excellent.

The extrance salary within the range stated will depend upon the qualifications of the appointee as shown in the examination and the duty to which assigned. Certification to positions paying $2,100 or more will ordinarily be limited to applicants who are more than 24 years of age and who have had considerably more than the minimum of the required experience or education.

Appointees whose services are satisfactory may be allowed the increase granted by Congress of $20 a month.

The duties of appointees will be to inspect warehouses for the storage of cotton licensed or for which licenses are applied for under the United States Warehouse Act, and to perform other miscellaneous duties in connection with

the administration of the Act. It is essential that applicants have had experience in cotton warehouses.

In the course of inspecting warehouses it is necessary to analyze financial statements. Ability to make thorough analyses is essential. Persons appointed to the field service will be required to be away from headquarters about 75 per cent of the time.

A separate register of eligibles will be established under the subject cotton, and applicants must state in their applications that this is the subject in which they desire to qualify.

Competitors will not be required to report for examination at any place, but will be rated on the following subjects, which will have the relative weights indicated:

	SUBJECTS.	Weights
1.	Education, training, and experience	70
2.	Thesis (to be filed with the application—eligible rating required)	30
	Total	100

The ratings on the first subject will be based upon competitors' sworn statements in their applications and upon corroborative evidence. Applications must show either (a) graduation from a college or university of recognized standing and at least two years' responsible warehousing experience; or (b) the completion of 14 units of high-school work and an additional year of the required experience for each two years lacking in the four years' college course.

Responsible investigational work along agricultural lines may be substituted for responsible warehousing experience to the extent of one year.

Applicants must have reached their 21st but not their 50th birthday on the date of making oath to the application. These age limits do not apply to persons entitled to preference because of military or naval service.

Applicants will be admitted to this examination regardless of their residence and domicile; but only those who have been actually domiciled in the State or Territory in which they reside for at least one year previous to the date of making oath to the application, and who have the county officer's certificate in the application form executed, may become eligible for permanent appointment to the apportioned service in Washington, D. C.

Interested persons should write the U. S. Civil Service Commission, Washington, D. C., for further information or for application blanks.

A Spindle Grinding Rig.

EDITOR COTTON:

Some time ago we found that a number of the spindles on our spinning frames were worn on the points, so that they wobbled when running, and as spindles cost around fifty cents apiece, we devised the following method of pointing those that were worn.

First, we took two 16-inch pulleys and riveted a piece of galvanized iron around them, making a drum. This we mounted above a lathe to drive a grinder. Then a grinder was made to be used in the tool post, having a small grooved pulley made on one end of the spindle, to be driven from the drum by a band. Next a jig was made to fit the spindle of the lathe and a tapered hole bored in it, with the same taper as that of the spindles to be ground. The grinder was run at 7,000 r.p.m. By setting the compound on the lathe to the bevel desired, we could pass the grinder by the work and back again, so as not to wear the emery wheel so fast, as spindles are very hard.

This rig worked fine, and we used it to grind 5,000 spindles which are now running true and satisfactorily.

R. E. B. (Ga.)

An Opinion on Fly Frames.

EDITOR COTTON:

With due respect for the efficiency and intellect of most mill men in charge of fine goods mills and their departments, still, in my opinion, the best mill men are found in the medium, coarse and waste mills.

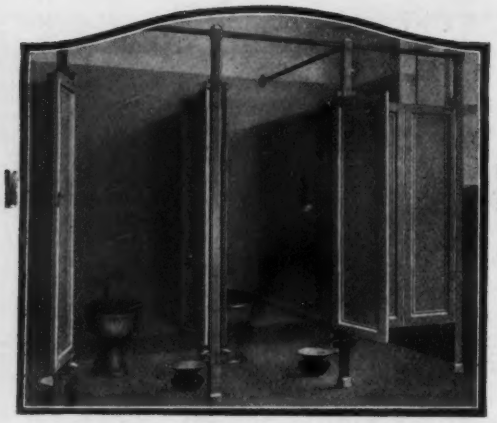
For instance, a poor carder has a better chance to get by in a fine goods mill. Let us assume that conditions on the fly frames are very unequal in any fine goods mill, the strength of the strand will hold that relationship, simply because the strand is stronger than the resistance offered by the increasing diameter of the bobbin. Not only in fine goods mills, but in any mill where the average length of the staple exceeds the distance from the point of pressure on the paddle to the first warp on the presser finger, unequal conditions can exist and give little or no trouble, but in any mill where the average length of the staple is shorter than the distance quoted, it takes judgment and a great amount of vigilance to hold conditions equal. You need not be an expert to reason that out.

On any bobbin-lead frame, the least play in the skew or bobbin gears means strained roving, because the bobbin leads the flyer. See the point? Therefore, if the staple is short the strand will be strained and in some cases snap. So it is the same with the increasing diameter of the bobbin, especially with short, fluffy stock or waste. If a tooth of twist is inserted, production is lost, and in some cases the twist will run in the light places and spoil many top rolls in the spinning room. Yarns made from fluffy stock or waste are, as a rule, very uneven, and this it is that puzzles a carder running such work. If he doesn't put in more twist the play in the gears and the increasing diameter of the bobbin is always stronger than the strand, and the slightest unequal conditions will cause strained work, and continual snapping of ends. So it takes a mighty good man to have the necessary judgment and ability to hold the relationship of cones and flyers equal.

This is only one case to prove that the men in the medium, coarse and waste mills must be up-to-date and have the efficiency necessary, which is acquired only by dint of practical experience on that line of work.

Wash (Mass.)

A new type of lining has been adopted as an improvement on the friction surfaces of the "Universal Giant" friction clutch manufactured by the T. B. Wood's Sons Company, Chambersburg, Pa. This new lining is known as "Non-Burn," and it is said to have a considerably higher co-efficient of friction than wood blocks or other substances heretofore used on this clutch, one of the special claims for the improvement being that the lining will not burn out and will wear considerably longer than anything used heretofore for this purpose. These clutches are made in sizes ranging in rated capacity from 5½ to 488 horsepower at 100 r.p.m., and are supplied with one, two or three friction discs as may be required.



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When we say Sanymetal is a strong, substantial product we mean that it is all heavy-gauge Armco Ingot Iron, full pickled, full cold rolled, finely finished in baked enamel, practically rust-proof—a metal furniture sheet with a metal furniture finish. We mean that rust-proofing is also applied, in the form of Sanymetal Electro-Zinc Plating, to all hardware and base castings. We mean that partitions and doors are carefully spot-welded at corners and to posts. We mean that self-closing doors are equipped with wear-proof Sanymetal Gravity Roller Hinges. We mean that a sufficient number of installation bolts is used to insure rigidity, even at the expense of a little more erection time. For these are the things that make Sanymetal live up to its name and reputation—a durable, sanitary, clean-cut, shake-and-rattle-proof Toilet Compartment.

And the same standards of value apply just as consistently to Sanymetal Office and Mill Partitions.

The Sanymetal Toilet Catalog is No. 7—the Office Partition Catalog is No. 4

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Warren Soap Warren Service

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Incorporated 1890

Designs for Fancy Cotton Fabrics.

(*Continued from page* 855.)

3 1 1 3

1 7 1 1

and represented on point paper by the 32 threads in the central portion of design H, Fig. 254. This design shows one of the white stripes and part of the blue stripes which adjoin it, with one repeat on 18 picks of the large design in the direction of the filling. Practically all the threads in the blue stripes interweave with the filling in the well-known 2 up 1 down twill to right. The first eleven threads and the last eleven threads of the design H show clearly the movements of these threads.

In order to minimize the lengths of the filling floats where the two weaves join, the last thread of blue and the first four threads of white form a sort of weft rib between the stripes, developed naturally by the filling. The order of interweaving for these ribs, which form an elegant border to the white stripe, is shown in design H by threads 12 to 16, and threads 49 to 53 both inclusive.

The working particulars for the production of this cloth are also shown in Fig. 254, where J is the draft on 23 harnesses, and K is the weaving plan on 23 by 18. The two leaves for operating the plain and rib threads are in the front, next comes three leaves for the 2 up 1 down and lastly 18 for the fancy weave.

In practice it would, of course, be necessary to repeat the draft on leaves 3, 4 and 5 until all the blue threads had been drawn through the harnesses.

The pattern in Fig. 255 is a good example of spotting with extra figuring threads on a perfectly plain ground. The cloth has good textural qualities, and the further advantage of being simple in structure. All the warp threads are 2-ply twist; the ground threads are composed of green and white, while the extra figuring threads are 2-ply brown. The filling is also 2-ply yarn, all white.

The warp threads are arranged in the following order:

Green and white twist	7	2	2	7	= 18
Brown	3	3	3		= 9
Threads per repeat					27

but the complete design, shown at L, Fig. 256, obviously requires two repeats of the foregoing order of warping. The figuring spots are arranged in the cloth in the well-known diamond or plain weave order, and each complete spot is made up of nine smaller spots set in the form of a square. Neglecting the threads which form these spots, there are 30 threads per inch in the warp with an equal number of picks of filling per inch.

It will be seen from the design at L, Fig. 256, that one complete unit of the design and pattern occupies 42 threads and 32 picks. The positions of the extra filling threads on the surface of the cloth are indicated by solid squares, and although six lines only are represented on paper, there are actually 18 threads, so that the repeat in the way of the warp is 54 as already mentioned. It should be observed that these figuring threads, when not on the surface, simply float

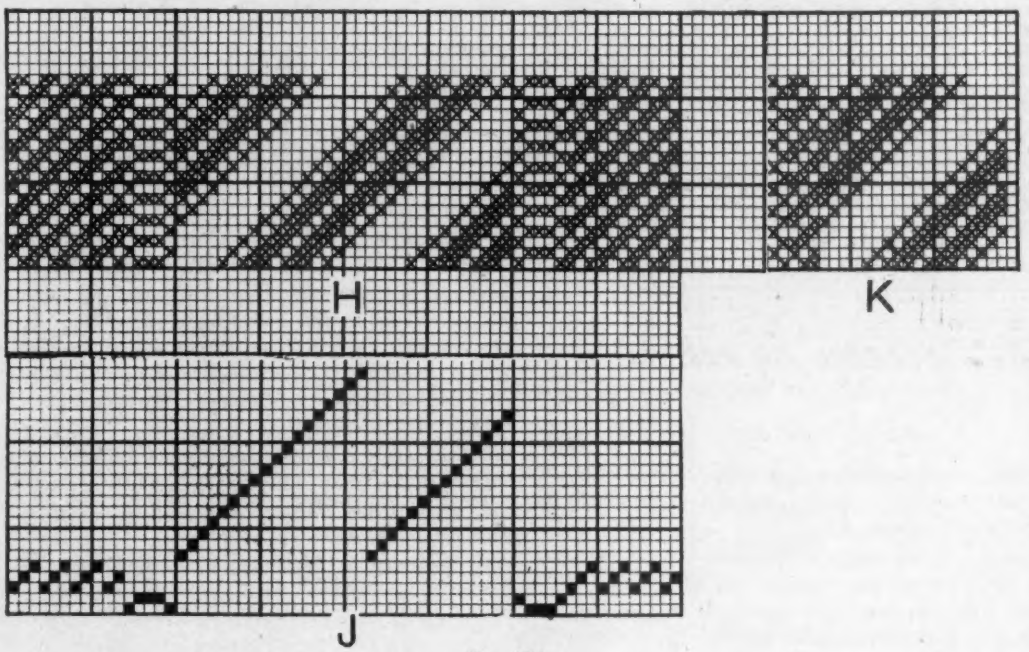

FIG. 254.

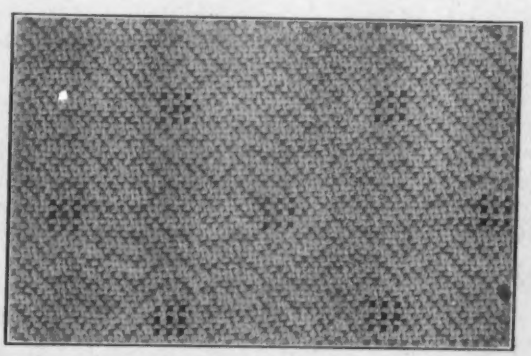

FIG. 255.

on the underside of the cloth between successive spots, and are not stitched in any way to the fabric. When the figuring threads are on the surface of the cloth, the adjoining threads on the right-hand side in design L float on the back; this arrangement is essential to prevent overcrowding at these points, and to enable the figuring threads to show prominently.

Although the ground threads weave plain, with the slight exception indicated, there is a very pronounced ef-

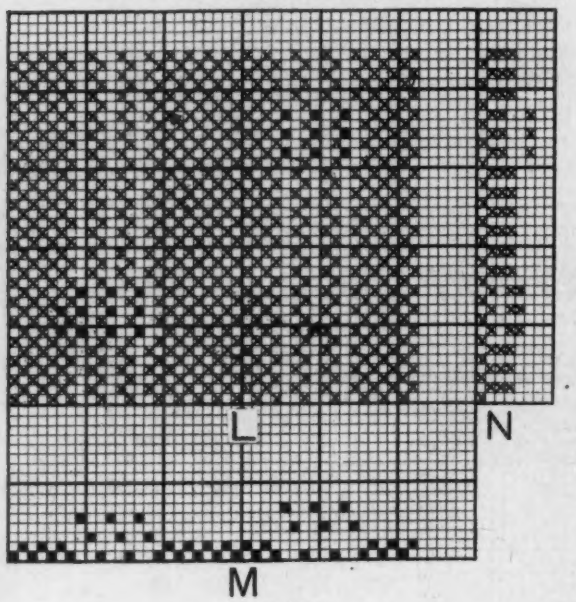

FIG. 256.

fect in the ground due to the 2-ply green and white twisted threads of the warp. In fact, unless closely examined, the ground has the appearance of a fancy weave.

The cloth requires only six harnesses, two for the plain ground and four for the figuring and adjoining threads. A suitable draft for this design appears at M, Fig. 256, and the corresponding weaving plan at N in the same figure.

At its mid-summer meeting, held recently at the Biltmore Hotel, New York City, the National Council of American Cotton Manufacturers elected officers for the coming year. Robert Amory, of Boston, was elected president succeeding Stuart W. Cramer, of Charlotte, who has served two terms; Mr. Cramer was made vice-president; F. J. Hale, of Boston, was elected treasurer with H. C. Meserve as secretary. The southern members of the council are C. E. Hutchison, of Mt. Holly, N. C.; W. E. Beattie, of Greenville, S. C.; A. W. McLellan, of New Orleans; Stuart W. Cramer, of Charlotte; John A. Law, of Spartanburg, S. C.; Capt. Ellison A. Smyth, of Greenville, S. C.; and Cason J. Callaway, of LaGrange, Ga. One of the features of the meeting, it was stated by W. D. Adams, the retiring secretary, was the adoption of a strong resolution of protest against the cuts in rates in the yarn and cloth rates of the pending tariff bill by the senate.

It was at this meeting also that presentation was made to Stuart W. Cramer of a handsome gold and platinum watch and chain by a special committee from the American Cotton Manufacturers' Association, in recognition of "distinguished services" to the textile industry by his work in Washington. Mr. Cramer has served for ten years as chairman of the tariff and legislative committee of the American Association, and at the annual convention of the organization in Washington, a resolution favoring the presentation of a memento in appreciation of his services was unanimously carried.

W. G. Sirrine Makes New Connection.

William G. Sirrine, counselor at law, who is president of Textile Hall Corporation at Greenville, S. C., has formed a connection at Washington with Miller & Chevalier, leading attorneys there, who specialize in practice before the courts, commissions and government departments in Washington, including cases involving Federal income, estate and other taxes.

Mr. Sirrine now has an office at Washington with his new connection in the Southern Building. Miller & Chevalier also have an office in New York, 61 Broadway, and Mr. Sirrine will spend a part of his time there. His name will appear in the next issue of the telephone directories in Washington and New York. Arrangements have been made by which any business directed to Mr. Sirrine at either of these addresses, or at Greenville, will receive immediate attention.

The affairs of Textile Hall are well organized, and it is pleasing to note that while Mr. Sirrine's new connection will take him away from Greenville for a considerable part of the time, he will continue to direct that institution. Next spring there will be three and perhaps four expositions, namely, the Southeastern Pure Food Show, the U. S. Good Roads Exposition, the Carolina Pharmaceutical Show, and in the fall, a big exhibit of textiles and other products made south of the Potomac, to be known as the "Made-in-the-South" Show. Matters have been arranged so that each one of these affairs is thoroughly organized and conducted under the cooperation of the committee who are interested in the industry mainly represented by the show.

Steel windows for all classes of buildings are described and illustrated in a recent publication of David Lupton's Sons Co., known as Catalog No. 110. A section in this book that is new tells of the application of this type of equipment to residence buildings. The remainder of the chapters is a condensed form of that appearing in the No. 11 catalog describing other steel equipment for general factory use and other purposes.

Newport Chemical Works, Inc., of Passaic, N. J., has recently succeeded in duplicating the old Benzo Fast Orange S, and is marketing the product under the name of Newport Direct Fast Orange R S as an addition to their line of cotton colors. This product, it is stated, was particularly desirable because of its resistance to weak acids and alkalis, and the product is also claimed to have good fastness to light and washing and to be uninfluenced by metals.

A new publication on Micarta gears, Folder 4453, is being distributed to gear users by the Westinghouse Electric and Manufacturing Co. This publication, entitled "Quiet Running Gears," advances quietness, durability and efficiency as advantages to be derived through the use of Micarta gears.

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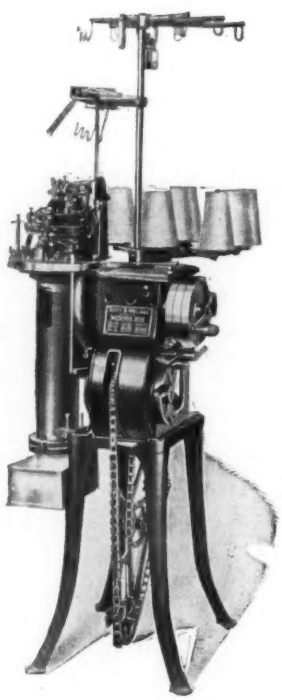
NEW MODEL H-H

Producing Ribbed Top Half Hose Complete



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Eliminating necessity of skilled help.

Saving of raveling waste which occurs when topped by hand.

Each stocking is dropped from the machine when finished.

Each stocking is automatically started upon the empty needles, producing a French welt without drawing thread or cutting, no ends of any kind to be removed.

Machine is fitted with five yarn fingers.

Provision is made for high spliced heel and double sole.

Provision is made for ring top and ring toe.

Speed of machine about the same as Model K.

Production about twelve stockings per hour on 3¾" 220 needles.

One operator can take care of the same number of machines as Model K.

The machine is built in all gauges.

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The Link or Purl Machine

BY G. R. MERRILL.

The link and link or purl machine is one built to give a greater range of fancy work than any of the ordinary machines. This machine is so arranged that it may produce either plain, ribbed, or purl stitch in the same piece of fabric. The fabric made may be entirely of any one of these stitches, a combination of them, side by side, or successively along the piece. The construction, which is peculiar to this machine, makes possible this range of stitches and the variations in pattern procurable.

The purl machine has two slotted needle beds but instead of being at right angles to each other, as in the ordinary machines, they are in the same plane and only a small distance apart. Another difference is that the needle slots are directly opposite each other, instead of each set being opposite the wales of the other bed. And, finally, there is but one needle for the two slots opposite each other.

All of these peculiarities are necessary because the needles move from one bed to the other, a thing not done in any other machine. Thus the beds must be in the same plane to allow the needle to slide from one to the other smoothly, and the slots must be directly opposite so that the needle may move from one slot to the other as though it is only a continuation of the first.

The needle itself is perhaps the greatest peculiarity of all for it has a hook and latch on either end and no butt whatsoever. The needle has two hooks and latches in order that it may knit off either end. As the needle passes from one bed to the other, what is the active end, or knitting end, at one time is in the slot and so cannot be knitting at another. Thus, it is necessary to have a knitting unit at either end of the needle. As the needle moves from one bed to the other, it slides through the loop of yarn, or stitch. Thus, a loop is often drawn by one end and then the whole needle passes through it and it is finally knitted off at the other end. This means that there can be no butt on the needle, such as usually controls the needle action, because it could not then pass through the yarn loop.

So, finally, comes the question of controlling the needle. This is accomplished by means of jacks. There are two jacks for each needle, although they are not both used at all times. A jack is in each bed and only one controls the needle at a time. In a sort of game of give and take, each jack controls the needle to a certain point and then yields it to the opposite jack. These jacks are thin metal strips, fitting in the needle slot, having a hook at one end which fits over the needle hook and a butt at the other end, by means of which both they and the needles are controlled. The outline of an ordinary jack is shown in Figure 2.

The needles and jacks are both, of course, controlled in their actions by the cams and even these are peculiar. The first point to notice is that the cams control the needles indirectly and so, very often, the action of the jacks will really be as important to the knitting action as that of the needles themselves.

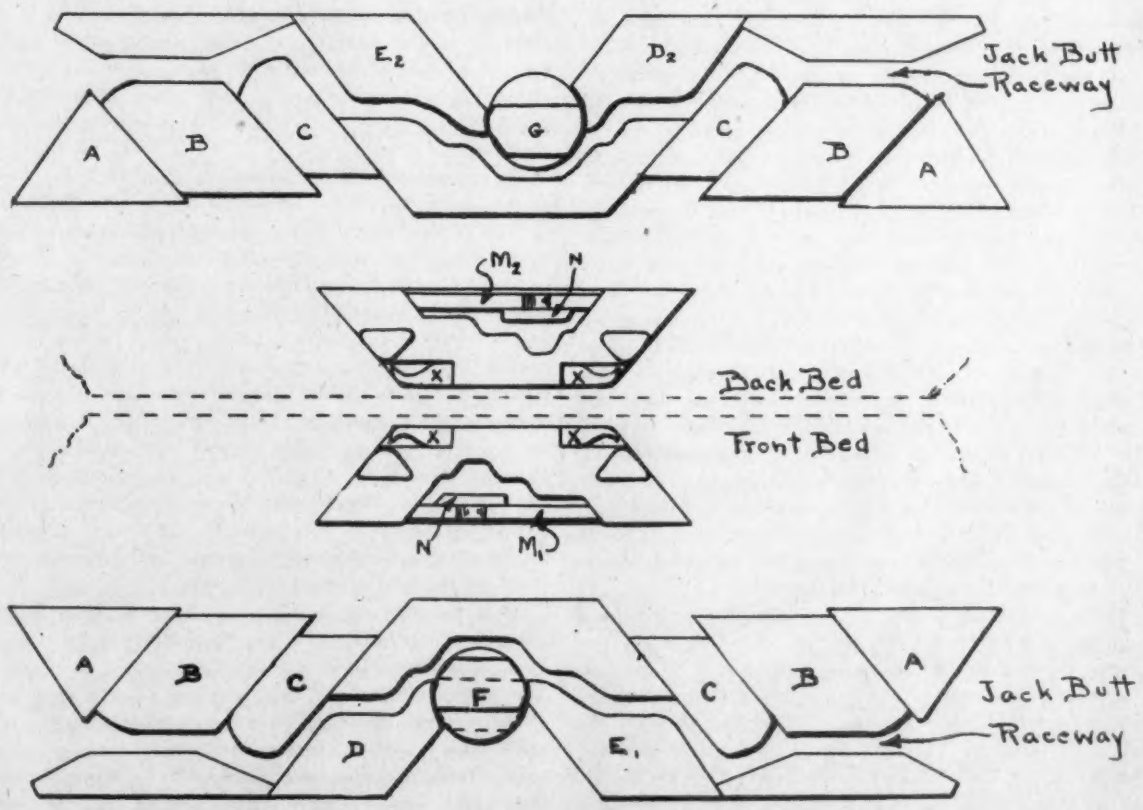

FIG. 1. LINK AND LINK OR PURL CAMS.

Figure 1 shows a plan view of the cams for the link and link or purl machine. The raceway is designed to control the butts of the jacks. The shape of the raceway shows that, as the cams move across the needle beds, the jacks are forced toward the center or towards each other, that at their innermost position they stay in the same line for a short time, and that finally they are drawn back to their original position.

The cams A, B and C are stitch cams, being adjustable to control the length of stitch which the needle draws. Cams D and E are raising cams which cause the needles to be carried far enough out to knit from the end which holds the old loop. Cams G and F are those which control the movement of the needles from one bed to the other and work in conjunction with the pieces M and N.

Figure 2 shows a side view of one set of these cams (upper line), the needle bed and the position of the jack when out of action. The space lettered "O" is the raceway occupied by the jack butt when in its active position. In addition to the parts shown in Figure 1, note the plate Y which runs the length of the machine covering the top of the needle trick or slot also occupied by the jack.

This plate Y is so placed that the front end of the jack can just pass freely under it. This means that if a needle is held, as shown just below in Fig. 2, by the jack that it cannot be withdrawn from the jack while the front end of the latter is under Plate Y. This is true because the needle cannot move to either side and the jack cannot lift up. However, when the jack is far enough back or front to have the front not under the Plate Y, the jack may lift and in so doing leave the needle free to be withdrawn. So, to put a needle under the jack shown, press the jack forward when not under the cams, until the forward end is in front of plate Y. Then placing a needle, with the latch open, in the needle slot, (the bottom of which is shown by the dotted line) and press it back until the needle hook is under the hook of the jack. When the jack is drawn back slightly it will be under plate Y in such a way as to prevent the needle from being withdrawn. This is the position to which cams D and E force the needle when it is knitting from one end only. The jack works to and fro with its front end under the plate Y.

When the needles must pass from one bed to the other, it is necessary to force them further out, far enough so that the jack in the other bed can get hold of them. This is the function of cams F and G. Also, the jacks must not be under plate Y, but must be free to release the needles which are to leave them. This, however, is taken care of when the jack is forced out by either cam F or G. For all the fact that the jacks must be free to release their needles, one or the other must draw them with it and so the distance over which each jack may release its needle is short and the time when one jack will release its needle is a time when the other will control it.

This controlling is done by the parts sketched between the two sets of cams (Figure 1). A short metal bar shown on each side as M, moves along and quite close to the needle bed at just the point where the needles are forced out the greatest distance. This bar M takes the place of plate Y and holds the jacks down so that the needles cannot be withdrawn. At all except one point, this is true, but where the shaded section of M is shown, a notch is cut in the under side of the bar deep enough to allow the jack to rise and release the needle or to allow a needle to slip under it. These shaded spaces, then, show the only places where the needles are free to move from one side to the other.

These notches are not placed opposite each other, but are so arranged that they are opposite the place where the opposing set of cams draws its jacks back. So, at just the time when one set of jacks tries to draw the needles with them, the opposite jacks release their hold and so let them move away to the other side.

These cams are so arranged that the needles may pass across from the front bed to the back bed only as the cams move to the right, and back again only as the cams move to the left. For example, as the cams move to the right with all the needles in the front bed, the jacks are forced in by cams D_2 and E_1. E_1 is controlling the needles. Then cams F and G force the jacks further in. As cam F forces the needles, by means of the front jacks, across to the back bed, the back jacks come toward them and under the notch in the back bar M_2. At this time, one hook of the needle is forced under the back jack. Then, as the cams continue to move to the right, the back jacks pass the notch in M_2 and so grip the needles. Just as these back jacks begin to move back, tending to draw with them the needles, the front jacks come under the notch in the front bar M_1, and the needles are released, and so, as the cams move, are drawn by the back jacks to the back bed. This is the complete action of the transfer from one bed to the other and is simply reversed as the cams move in the opposite direction.

The latches of the needle must always be open when they are forced under the controlling jacks. To make this opening positive, the four small devices marked "X" are placed in such a position that they insure all latches opening. These devices are small metal blocks especially shaped with curved and rather pointed ends, which project under the latch and lift it, finally throwing it back against the needle shank.

In making any but the ordinary purl stitch, it is necessary to have the needles either all stay in one bed, some in stay in each bed, or some stay in one bed and others move to and fro. This is controlled by means of cam F and two movable pieces attached to bars M_1 and M_2, in such a way as to close the notches in them at times. These are all controlled by one handle. Cam F is held on a circular block which makes one-half a turn when the controlling handle is moved and then the cam position is shown by the dotted lines. This means that the jacks of the front bed are not forced farther in than they are by the cams D_1 and E_1. Cam G is not changed and, in fact, is not movable. The blocks N are normally drawn up away from the needle beds, but when the cam F is turned, they are lowered and have the same effect as though they filled the notches in the bars M_1 and M_2.

This possible change brings about a condition where the cams of the front bed do not force the jacks far enough in to allow the jacks of the back bed to catch the needles. Neither can the jacks of the front bed catch or grip any of the needles held in the back bed. Thus, a needle stays in the bed where it happens to be when the controlling handle turns cam F to the position shown by the dotted lines. The blocks N close the notches so that the jacks of neither bed can lift to release the needles, and so the

needles even if some are in each bed are gripped continually by the jacks holding them.

The lower part of Figure 2 shows the movements of the jacks and needle in carrying the needle from one bed to the other. At this same time, the needle knits one course and if it is then drawn back, it knits another course. In this respect, the link and link machine is like other flat machines.

The plain fabric is produced by keeping the needles always in the same bed, thereby causing knitting from one end of the needle only. This is accomplished by throwing all the jacks of one bed out of action, by setting the cams so that the needles are not caught by the other jacks, and consequently stay in the same bed all of the time.

The rib fabric is produced by having all the jacks in the bed controlling the needles and just those required for the desired rib in the empty bed. Then, by setting the cams to make a purl stitch and knitting one course, the jacks set up in the empty bed draw the needles from the other bed and they are then set up to give the desired rib. To keep the needles in this position, either the jacks of the front bed having no needles under them must be drawn back out of action or the cams must be adjusted so that the needles which have crossed to the back bed do not return to their original positions.

The purl fabric is made by having all of the jacks set up in each bed to give the desired width of fabric, and then arranging the cams so that when moving in one direction, they cause the needles to move from the front to the back bed, and on the reverse movement, they cause the needles to return from the back to the front bed.

By using combinations of these fabrics in an article, it is possible to make some very attractive designs. One of the combinations is that of a rib stitch and a plain stitch used in making slip-ons or sweaters. The lower part of the garment is made with a rib stitch (possibly six to eight inches of rib fabric) and then the body is made of a plain fabric. The sleeves are made of plain fabric, but at the cuffs, the rib fabric is used again. Generally, this is a one and one rib, although a two and two rib is possible. This makes the lower portion of the slip-on fit the hips very closely and the cuffs hug the wrist.

Another use of the rib stitch is to make the waist line of a garment smaller. Thus, a sweater of purl fabric has a band of rib fabric around the waist, or possibly just across the back, causing it to shrink in and fit the wearer.

This same arrangement has been used to make the part of a scarf which comes about the neck less bulky. A scarf of purl fabric has a neck band of two and two rib to make it more comfortable to wear.

In the construction of caps of plain fabric, sometimes the stitch is changed at the upper end to a rib stitch. This draws the crown of the cap in and makes less bulk to take care of in closing the top.

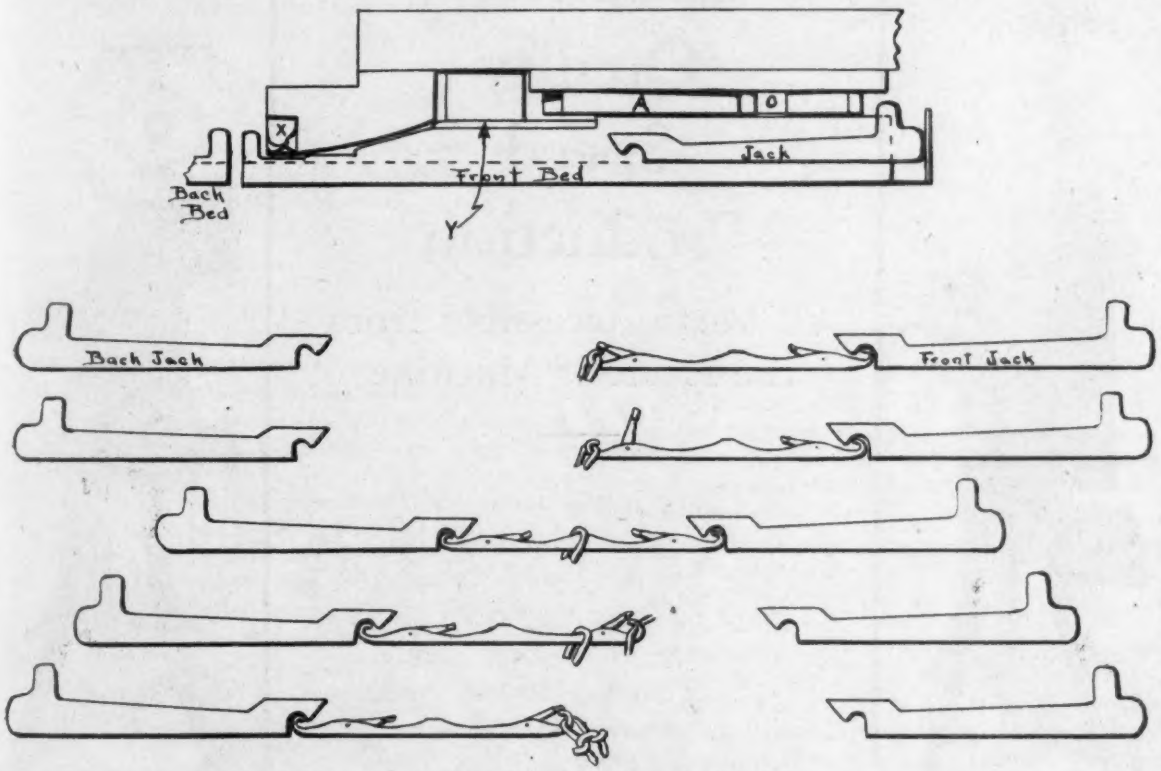

FIG. 2. SHOWING THE JACKS AND NEEDLES.

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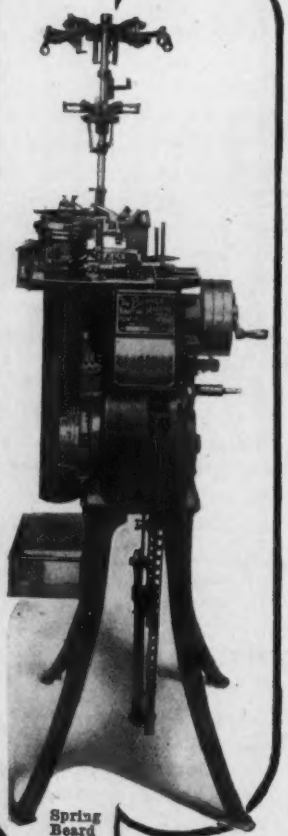

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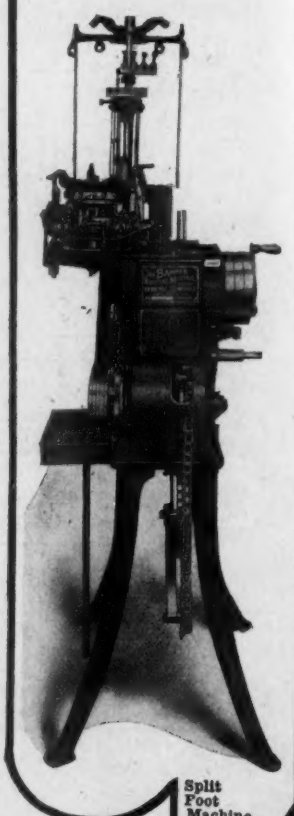

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Technical Education in the Hosiery Trade

BY WILLIAM DAVIS, M. A.

Technical education for the hosiery trade has attained increase in prominence in recent years and most centers of the industry are now taking the matter up with seriousness and concentration. The primary object of all technical instruction is to give those engaged in the industry an increased interest in their daily work and bring all their powers to bear on the work of the firm with which they are employed. In this way a higher level of intelligence permeates the work and the results are to be found on every hand in the shape of increased efficiency, greater output and increased ambition on the part of the personnel to excel in their particular department. But in addition to training the most promising workers who are likely to attain positions of responsibility in the industry, technical education should also be given to the sons of the manufacturers which will fit them to control the business after their elders have retired.

In the past prosperous manufacturers have frequently sent their sons to one of the older universities to obtain a broad general culture, leavened with a large proportion of time given to sport. Many businesses have suffered through this kind of training for when the men come later into the factory, they have only a superficial idea of the business and their college career has unfitted them for a vocation to be spent in the realm of practical things.

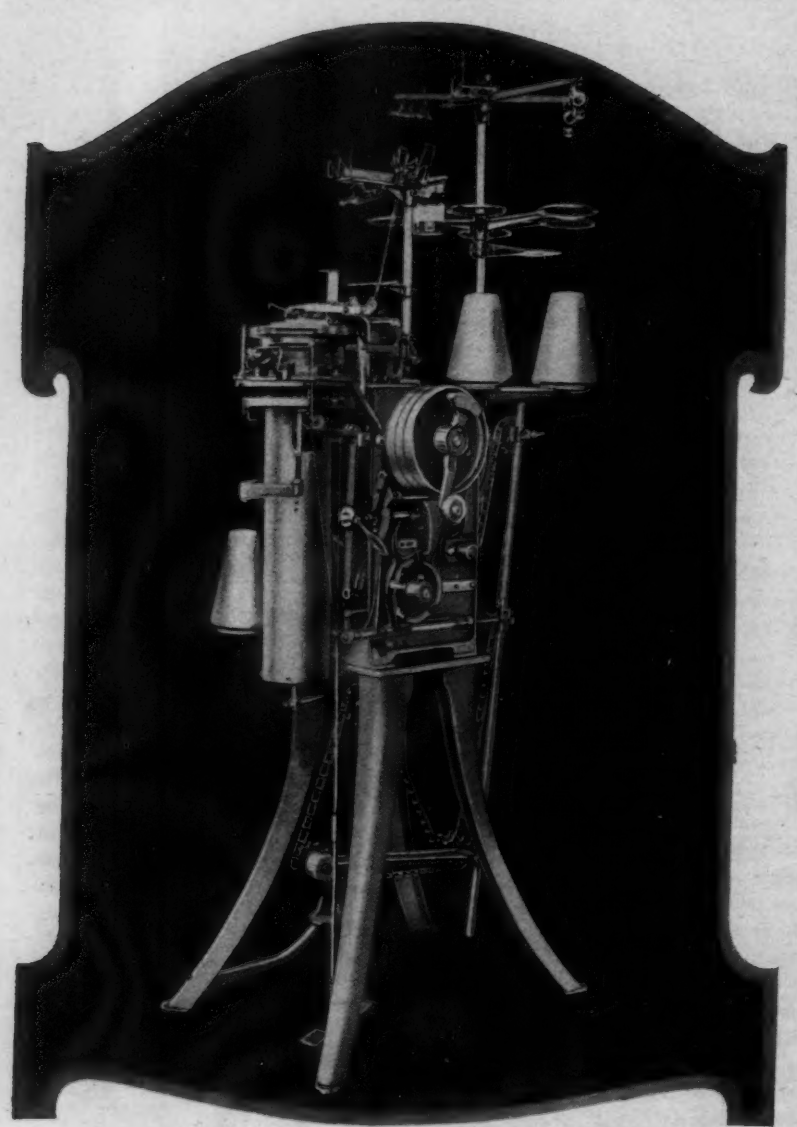
It is recognized that the most valuable training in the hosiery trade is given in the teens and should include a thoroughly practical experience in the manufacturing operations from start to finish. If the general school education be continued too late in the teens, the lads have passed the period when manual dexterity can be acquired and they show little aptitude for acquiring the practical work of the factory in a way which will enable them at a later date to control others. Nothing so weakens the influence of the head of a business in dealing with his foremen as the knowledge on their part that he has had no practical acquaintance with the industry, and such a man is usually in the hands of his practical men completely. This factory training is doubly beneficial if some kind of discipline can be introduced; when serving in any particular department he should be encouraged to emulate the output of experienced workers, which is of course very difficult, for the employer's son is generally treated with deference and some indulgence. For these reasons many prefer to have their sons' first years in business spent with a strange firm, and some favor training of a commercial character as a foundation.

It should be borne carefully in mind that manual dexterity can best be developed in the early teens, and in general, it is found best to start the lad in the factory with the elementary operations and working such machines as winding. At a later stage he gains experience in the manufacturing departments, learning to manipulate and keep running the various types of flat and circular machines. Along with this it is most important to learn the rules which govern the production of good work, the prevention of waste, care of shafting and machine belts, the speeds of machines and the best means of obtaining the highest production compatible with perfection of fabric texture.

In recent years it has been felt that this kind of training, although highly favored by the "Old School" and in its way producing most successful results, does not quite meet the needs of present day manufacturing. The industry has developed so rapidly in the scientific and mechanical side, and the scope of the industry has been so much extended that it is being increasingly recognized that factory training in itself is insufficient. This has been the root cause of the development of technical departments in Colleges and elsewhere with their staffs of experts trained in the various branches of the subject and having the aptitude and the duty of imparting the results of their knowledge and experience to those placed in their charge. If this training is to be effective, it is now generally recognized that we must reproduce, as far as possible, factory conditions and our technical departments must be factories in miniature where the students can operate the same machines, study the same operations and carry on the production of fabric and garment in its various stages under practical conditions. While practical work must bulk largely in the training, the acquiring of mechanical skill on machinery is not itself of considerable value since but few of the students are destined to become operators. The real purpose of the practical instruction is to give a fundamental knowledge of the principles of manufacture and for this reason a sound teaching of the theory of the operations must be given, mechanisms must be taught, processes described technically so that the students will learn the essentials of production on any class of plant.

Many expect to obtain specialized instruction in such schools but this is seldom possible in the first few years at least. It is essential that the groundwork should be a comprehensive one dealing with the trade in all its branches, and when these essentials have been learned it becomes possible to allow of some degree of specialization in the branch in which the student is particularly interested. The present day factory system tends to become more and more specialized and the worker develops into a machine unless some opportunity is given to extend the borders of his knowledge by such facilities as are here outlined.

The matter of the previous training of students is rather important, and for the hosiery trade there are certain subjects in which it will be a great advantage to be moderately proficient if full advantage is to be derived from the instruction. Ability to express oneself clearly in English with correct spelling and punctuation is to be placed first of all these subjects and correct orthography is an indispensable adjunct in note taking. Another subject is drawing, for it is useful to be able to make a sketch or diagram, with clearness and to scale, showing the principles of motion of machine parts and the way in which they function in relation to each other. Rapidity and correctness of calculation is also indispensable with the elements of mathematics up to equations, but proficiency in the ordinary arithmetical processes is of fundamental im-



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portance such as multiplication, division, proportion and percentages, for most of the problems arising in hosiery work can be solved by anyone having a sound grasp of these principles. In addition to these, it is of great service if the student has had some training in elementary science, particularly in the system of making observations and recording the results of experiments. The use of balances in weighing, specific gravity, graphs, various units of weight and measurement and facility in their use are all of the greatest service when the student comes later to tackle textile problems.

Next to physical science, it is most useful to have a grounding in chemistry, for there are few branches of the industry which are not elucidated by a knowledge of this science. The character of alkalies and acids, methods of testing for these, and laboratory work are indispensable. Students who have had a groundwork of this description, before commencing the technical course proper, should be in a position to make the fullest use of the course of instruction. For those who have the opportunity, the full-time course of instruction has many advantages in that the student can combine his general school subjects and thus obtain a higher college education, at the same time receiving instruction in the principles of the industry which he is later destined to enter as his vocation. Economics and languages are recommended for those who may later require to visit foreign countries on business. In the hosiery trade the Spanish language is coming increasingly into favor on account of the growing importance of the South American market for knitted goods.

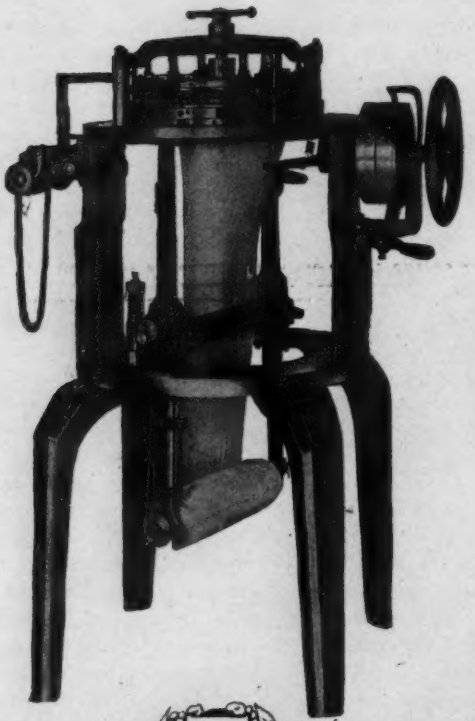
But it is obvious that a course of this character is without the reach of the great bulk of the young men engaged in factories and who are hoping to become skillful operators and later managers of departments. They are required in their various places of business during the day but most manufacturing communities now recognize what is known as the part-time system of instruction whereby workers selected from various departments are given the opportunity to attend practical and theoretical courses in employers' time without loss of pay. This system has now been in vogue for a number of years and has been productive of much better results than the old-fashioned "night" school.

In the evening class the students have to study when they are worn out by the work of the day and so are unable to concentrate their attention on the subject. While this system has, in the past, produced many excellent students, it does not produce the best results. In the evening hours the mind is accustomed to and seeks for recreation and rest, and with instruction imparted during the day, the mind of the student is fresh and receptive and the individual is able to bring the powers of attention to bear on his studies which he is accustomed to bring to his work. From the nature of the system it is obvious that most manufacturers cannot spare more than a limited number of their young people in this way and to produce the best results it is desirable that the selection of students should be made by merit and relays of students arranged. Many firms have already found very beneficial results accruing from this system, the privilege of being the selected students is keenly competed for, and a higher all-round average of intelligence is developed which has its influence on the whole personnel. It is found that the breadth of the training makes the mind keen and active and causes the students effectively to think out the problems which they encounter every day. It is also a practice being adopted by an increasing number of firms to encourage the brightest of these students by promoting them to higher posts in the industry and giving them work of responsibility which in former times they had to wait many years to obtain.

The hosiery trade is divided into various branches, the spinning of the yarn, selection of raw materials, the manufacture of the yarns into web, turning the material into garments and finally dyeing and finishing the goods. In a comprehensive course of study all these branches should be taken up because it is essential for the manufacturer to know about the yarns and the raw materials he is using, the system of manufacture, and finally a course of instruction in dyeing, bleaching and finishing is of the greatest interest even although this work is not undertaken by the trade as a whole. A complete course of instruction should include such subjects as the following: raw materials used in hosiery manufacture and the various types of cotton, wool and silk yarns. It is found an advantage to deal with hand machines first but it is a mistake to spend too much time in studying them to the detriment of the modern swiftly moving types. The principles of garment manufacture are of absorbing interest along with the systems of cutting out for cut goods and the principles of garment designing for the fashioned trade. To be able to analyze knitted fabrics and give all particulars for accurate reproduction of any given article or garment is a highly useful exercise and skill in this direction can be cultivated with the highest practical benefit. In the cut or circular trade in particular, knowledge of the chief types of sewing machines and the advantages and disadvantages of the various principles of sewing and seaming are of considerable interest along with the newer developments in fancy trimming, edging and embroidery which have so much to do with the sale of an article. Dyeing and bleaching of the knitted product are of course highly specialized branches of the industry but the young men who desire to be trained in modern manufacture should find a course of theoretical and practical work in these branches of very considerable interest and practical benefit. The manufacturer is all the time up against the defects produced in these various operations and it is of the greatest service for him to be able to locate such faults and suggest remedies.

In addition to the usual courses of a more or less routine character, attention should be given to the newest methods and developments in hosiery machinery for there is no branch of the textile industry which has such a swiftly changing range of machinery as the knitting industry. Machine builders vie with each other in feverish competition to produce new attachments on their machines to cope with the demands of the new season, for patterns which sold last year may not be looked at this season and these new designs can often be produced only by the introduction of special machines with attachments for producing these novel effects. The manufacturer who remains content with his present plant is liable to find himself in the background before many years are over and the best policy is to arrange for a gradual replacement of the present equipment, laying aside each year a certain proportion of the profits for this purpose.

Many manufacturers are considerably interested in



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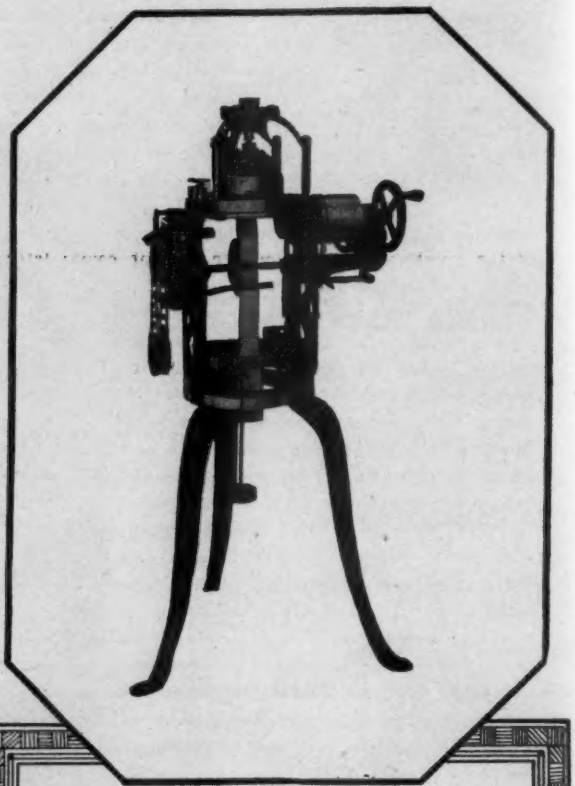

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training the rank and file of their workpeople, in fact, the training of help for their workrooms often appeals to them much more favorably than the training of those who are likely to fill the higher posts in the management. They declare that what they are most interested in is the development of a high degree of manual dexterity so that the workers will attain to a high state of productive ability. At the present time the training of new help is often carried on in a most haphazard way, causing much waste to the employer. Even in large factories it often happens that the new worker has to pick up her job as best she can, there is no organized method of teaching with the result that careless and wasteful habits are formed right at the start which handicap them throughout their working lives. In each department one experienced hand should be detailed for this work, the course should be instructive and graduated with some eye on the principles of educational method.

Educational method may appear a rather forbidding term, but the basic principles are embodied in the dicta, a little at a time, begin at the beginning and make the course progressive from the easy to the more difficult. Of late increasing attention has been given to cultivating the shortest possible method of performing any particular operation with a view to eliminating all unnecessary operations. A careful system of selection is also being exercised with a view to eliminating those who are found to be unfitted for certain operations and who appear to be incapable of learning them. For such, a change of vocation may be found beneficial and transferred to another department they may do quite well. The writer is acquainted with a very successful manufacturer of knitted goods, who insists that the first few weeks of factory experience for all new workers must be spent in practicing tying the various kinds of knots used in the factory according to the material being worked on the frames. Another manufacturer insists that all girls and boys who enter the machine or frame departments shall spend some time in running on rib tops for the frameworkers, as they find that the dexterity acquired in this operation forms a splendid basis for subsequent productive capacity in the factory. In another case a rigorous course of instruction is insisted on for all girls in the methods of repairing and mending looped fabrics. It is claimed that this gives an accurate idea of the structure of the knitted loop, and enables frameworkers to repair many of the minor defects before they leave the machine. As against this practice others say that they cannot afford to reduce garment production by having them mended by the frameworker for they find that the best results are obtained by keeping the machine running and having fabric defects repaired by skilled menders after the material has left the machine.

In new districts, where the industry is being established, special conditions of training arise and large concerns find that they have to institute means of instruction which will aim at producing efficient machine minders where the instruction is firstly and lastly concerned with mechanical operation and executing these with the greatest speed possible. There is no question of the training such in the higher branches of theoretical and scientific work, the aim being to produce efficient workpeople only who will execute given movements in the shortest possible space of time.

The Knit Goods Market

The knit goods market was given a stunning blow by strikes, the full effect of which was felt in industry and distribution during August, after an intimation in the latter part of July of what was to come. While strikes in the clothing and similar trades perhaps involved more wage earners than those of the coal and rail labor unions, it was the latter that caused the chief damage, for scarcity of fuel necessitated the shutting down of many plants and threatened demoralization of transportation left a feeling of uncertainty calculated to hold transactions as between buyer and seller in check. Unless the unions get more than they struck for they will have paid dearly for their voluntary idleness, and thousands who were thrown out of employment through intimidation and coercion and were involuntarily idle must suffer with them. Then there have been losses through butchery that cannot be repaid—the wanton slaughter of men for no reason other than their desire to earn a livelihood in places deserted by a disloyal element, a crime that perhaps never will be avenged.

The strikes have been a major factor in the closing of many hosiery mills and the operating of hundreds of others on short time. In Reading, Pa., it is estimated the seamless hosiery mills as a whole were operating in mid-August on a basis of 30 per cent of capacity. Singularly enough, the five full fashioned mills in that city have not slowed down. Most of them are busy. One had a tilt with about 200 employees over the matter of completing their work on one of the hot August days, and won. The work people, that is, a part of the force, wanted to quit work in the middle of the afternoon. The management said no, that as the knitting room was no warmer than any other place, and as a large majority of the operatives was content to complete a day's work, all should remain at their posts. The hot weather complainants said they would quit, whether the management consented or not, and they did. In less time than it takes to tell the story they had lost their jobs; were told to not again report for work. For days after they were reporting to other mills, seeking employment, which was not easy to find, and most of the "strikers" are jobless. The owners of the mill made it plain that they, not the employees, would direct its operations.

The mill in question is losing no business through curtailment of production brought about by employees. The test of authority could not have come at a more opportune time. In fact, curtailment became a necessary expedient in numbers of hosiery mills. Distributors, whether right or wrong in their attitude, were unwilling to buy at prices necessary to a manufacturer's existence. The shutting down process, due in large measure to strikes, was helped along by antagonism to values. Cotton, wool and silk were holding in a quiet market, the tendency being upward, yet prices of some finished goods were headed toward declines.

Buyers went too far in not taking advantage of an over-supplied market, and many manufacturers went as far in the wrong direction in pushing production while

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buyers were in control of the situation. And what happened was a partial shutting down on production, this being carried so far that by the middle of August it looked as though in places where there has been surplus there will be scarcity. At that time it was being freely predicted that Summer sluggishness would be followed in the Fall by marked activity, assuming, of course, that as Winter approaches and idleness will be accompanied by more discomfort than in the warm vacation months, labor will be more inclined to go to work at the best wage obtainable and supply work for others.

But even the most optimistic took the stand that it would be unwise for manufacturers to accumulate stocks in anticipation of a brisk period. As was observed by Charles E. Leippe, president of the Reading Knitting Mills, accumulations, no matter how keen demand may be later on, will comprise excess quantities of some lines which holders might be forced to sacrifice for again acquiring ready funds. Besides, Mr. Leippe, pointed out, when a mill has stock laid up it usually is short of what the buyers want and long of what they do not want. If, as has been contended, there is an excess of knitting facilities for normal distribution, it probably will be found that in the event of sudden demand that excess will be sufficient for averting a famine of goods.

The wholesome effect of curtailing output in times of a plethora of merchandise was shown in the last several weeks, when jobbers were seriously inquiring for 176 needle carded cotton stockings at—their price—one dollar a dozen. There had accumulated among manufacturers and jobbers so much low end hosiery that mills not financially strong were compelled to part with goods at a loss for averting something more serious. Buyers were dictating prices and sought to bring about longer terms as well. Then happened what always happens in such cases—mills either quit producing or cut production. After a few weeks, manufacturers who had been content with 95 cents for stockings worth $1.05 could get a dollar, and some were holding for five to ten cents more. It was when buyers heard the higher quotation that they became anxious about hosiery at a dollar. A few mills were quoting under, but their prices seemed to raise in the mind of the buyer the question whether the goods would measure up to standard.

Either manufacturer or distributor can make a market for a time, but neither can maintain it always. There will be need for as many socks at $1.10 a dozen as at one dollar, but the buyer never will pay the higher price when there are so many socks that some holders must sell to get money for paying their help and yarn bills.

Considerable twaddle has been indulged in about what the consumer is willing to pay, distributors representing that an addition of ten cents a dozen to the mill price of hosiery will make the hosiery unsalable. The trouble has been not with mill cost, but with the fact that when a manufacturer advances his price, say, ten cents a dozen the retailer adds 2½ to five cents a pair. The retailer figures, for example, that he cannot pay more than eight dollars a dozen for silk stockings to be sold over the counter at one dollar a pair. He will mark down to 98 cents for a special sale, but is more likely to mark up to $1.25 after the special sale is over.

A retail store in Broadway near Leonard street, New York, displayed a window full of men's ribbed mercerized hose, as though a special sale were going on. The stockings were tagged $1.15 a pair. A somewhat better stocking was being offered by a reputable mill at $4.25 a dozen. If the jobber went the limit and exacted $6 a dozen from the retailer, the latter would have had his arbitrary 50 per cent on cost had he sold the stockings at 75 cents a pair. But the stockings were of the golf type, and quite attractive, and perhaps the retailer felt customers would not regard them worthy at anything under a dollar, and added fifteen cents for impressiveness. At any rate, every pair of stockings sold at $1.15 a pair returned the dealer 130 per cent profit.

The consumer is paying all of a fair price, but the mill is not getting its share of the spread between manufacturer and ultimate buyer. Canvassers are overrunning many of the larger cities in the middle west and New England selling ladies' silk hosiery from door to door. The usual price is $5 for three pairs neatly arranged in an attractive strawboard carton, and the ladies fall for it. One establishment in the middle west, which manufactures part of the hosiery it sells but buys the most of it from other manufacturers, has been getting an enormous volume of business from its canvassers. A manufacturer chanced to be present when hosiery from his mill was sold, after the salesman, trained in applying the deceptive nail file test, amazed a small audience with the apparent indestructibility of the fabric. In a store not two business blocks distant the identical stockings were being sold in the regular way at $1.25 a pair, and in another, farther away, at $1.50. The canvasser's customers paid him at least 50 cents more for three pairs than they would have paid the higher price retailer, who was not a good buyer if he did not get the stockings at a price netting him all of 50 per cent margin.

Retailers and manufacturers as well have complained of the inroads on their business due to the buying from canvassers, and several mill heads allege that the bell ringers have recourse to deceptive practices. In fact, it became a question with some manufacturing and wholesale interests whether the mills would not be justified in uniting in a campaign of education intended to check the direct-to-consumer business. They would not have the support of all mills, for some of them have been selling heavily to the concerns employing canvassers. In fact, while a number of seamless silk hosiery mills in Philadelphia were running at 50 per cent of capacity, one, supplying a direct-to-consumer establishment, was operating full time and was in arrears with deliveries to dealers who distribute in the regular way.

Intinerants, of course, ordinarily can obtain better prices than a regularly established retailer, and they can afford to take a broader license with their representations. Why they can was explained by the late Mr. Barnum. Their operations are furthered by the too liberal use of the term profiteering in its application to merchants indiscriminately, and are helped along by department store advertising exploiting comparative prices. When a store advertise an article at, say, "79 cents, former price one dollar," the suspicious "common people" reason that at the regular price the store must have taken down a profit suggestive of extortion. Resentment of prices believed to be unnecessarily high, with the sky the limit for some dealers, is lubricant on the machinery of the direct-to-consumer manufacturer employing canvassers.

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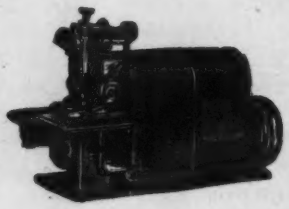

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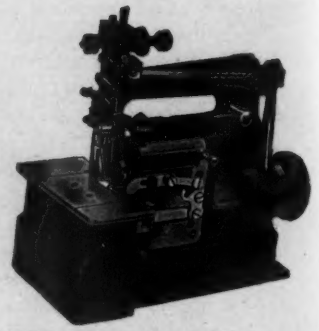

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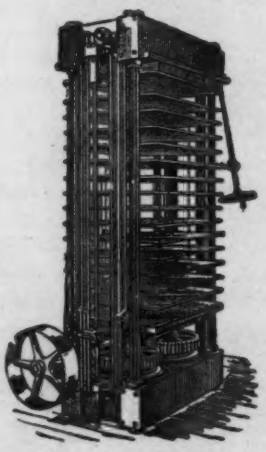

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Very good silk hosiery ought to be available to the ladies at less than the prices of the canvassers. Not a few jobbers with what they regarded excess stocks of full fashioned, have been parting with them at a very great sacrifice—in one instance under observation, at only a dollar a dozen more than the mill price. It would not be surprising to know that some jobbers have sold at a loss. One took a profit of only one dollar a dozen on goods costing him in the neighborhood of $14. This dumping by jobbers has made it difficult for mills to maintain their prices, and some very low quotations are heard. One good line of full fashioned, referred to as "a special," is offered at less than the lowest price of the Berkshire Knitting Mills, sold up for the year. Both ladies hose and men's half hose have been slaughtered by jobbers, forcing a few mills to announce reductions of a dollar a dozen. Prices of full fashioned have gotten so low, in some instances, that the seamless made, with the fashion marks, have become exceedingly draggy. One mill making seamless silk half hose may discontinue the line altogether because adequate prices are impossible.

The burning question with hosiery manufacturers is whether longer dresses really will be worn, and if so, will they call for silk or for wool hosiery? Opinion seems pretty evenly divided on the subject. At this writing the sort of hosiery the ladies will wear with their longer skirts is no less a problem than the bale yield of the cotton crop. The risk would be about as great whether one gambled with the caprices of fashion or the freaks of the weather. The owner of silk hosiery who is sacrificing it may be as far wrong as the jobber who cancels his order for wool.

Jobbers recently found it expedient to ask that deliveries of wool hosiery on order be held up a month. This usually is the first move when cancellation is contemplated. Some jobbers disposed of the matter by simply canceling. If it develop that wool hosiery is to be worn almost as extensively as last Winter, there is going to be a scarcity of the kind of goods wanted at the time when wanted. Manufacturers know no more about what will be worn as between wool and silk than do the dealers, and if the latter are afraid to buy for their needs, manufacturers have warrant for being afraid to put goods in stock, and some of them are not doing so. Mills with supplies of yarns in twist and mixture feel it might be wise to defer putting it in process while waiting for something approximately definite as to shades and colors. Besides, it is reasoned, yarn can be adapted to styles of hosiery yet to be brought out. There have been so many innovations that it seems a safe guess there will be others, and these may absorb the materials which were bought to go into hosiery of silk and wool in combination, so that there is a possibility of absolute safety in deferring manufacture until mills have dealers' firm orders. Where at all feasible, this policy ought to be pursued until the question of wool or silk has been disposed of.

No one doubts that silk hosiery will be worn as extensively as ever, barring the few months during which wool may be popular from the standpoint of comfort, leaving out of consideration its desirability as a concomitant of the short skirt. Whether production has been overdone is a question which must be left to the future. Of course there is the possibility that with raw silk commanding an average of $7.25 a pound, demand for silk hosiery at prices which manufacturers must obtain will decline.

Ladies' mercerized stockings have been so improved in fabric and appearance that it is not difficult to imagine a preference for that class of hosiery for a time as an economic expedient, that is, among the not ultra-fastidious. The mercerized Richelieu ribbed stocking has been quite popular, among even some persons who believe they dress well, and very classy types are available at 75 cents a pair. There is a big half dollar between the price of such a stocking and the better types of fashioned marked seamless silk. And it is pointed out that a nifty mercerized stocking under a dress touching the ankle would not look so bad, either.

One decree of fashion in favor of silk stockings for the ensuing season is that applying to ladies' shoes. Every indication is that low shoes with high heels will be the vogue, and that the shades promising of popularity are dark fawn, brown, black, otter and one or two grays, possibly beige, or nude. Even now, with Fall styles as they will be seen on the street but a few weeks ahead, the trade is utterly at sea over hosiery.

Last year a large jobbing house did not have enough silk hosiery. It was missing sales, some of its customers going to mills selling direct to retailers. The management blamed the buyer for the insufficient stock. A strike which closed 16 large mills was in progress and lasted nine months, and of course it was not so easy as it now is to go into the market and buy for "at once" delivery. This buyer, chafing under the reprimand from his chiefs, determined to be not caught short this year, and he bought very heavily early in the season. Now the house has more silk stockings than it knows what to do with, and the representation was made that it must part with its excess stock before it can buy cotton hosiery in the regular way. Doubtless there are other jobbers in a similar plight, and for the same reason. It is these in particular that are inclined to go short of hosiery in anticipation of long skirts.

Considerable confusion ensued over infants' socks after the lines of all of the several mills were opened for next year. It all came about as a result of eagerness to book business. First there was hesitancy on the part of several manufacturers to come out openly with prices. Two or three were selling quietly in the meanwhile, as usually is the case when formal openings for a season are under discussion. Then one mill came out with last year's prices, notwithstanding yarn was materially higher than at the corresponding date in 1921. In fact, two numbers of this mill were lower than a year ago, one by 10 cents a dozen, the other by 25 cents. This forced at least one other mill to promptly announce reductions to jobbers whose orders had been taken, and one after another followed. Price cutting was gotten under way in short order, and each manufacturer was charging some other with having started the movement.

Buyers who were looking lines over were disappointed that there should be any such disturbing tactics, and some went home without buying a case. Some of the larger houses are understood to have bought quite freely, but there is conflict of opinion of the actual business consummated. Not a few jobbers carried stocks over, or in other words, were far better supplied with staple lines than ordinarily at this season. But there were new patterns, and some very attractive, and these were among the first to be taken. But as to the sum total, it may be said the infants' sock season had an inauspicious opening, and

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excess of zeal probably is the explanation.

For a time after light weight underwear lines had been opened for next year hosiery was being neglected. Manufacturers virtually threw Summer underwear at jobbers. Prices were down to the low for a year ago and ran up five to seven per cent more for some few mill lines. Jobbers who came in at the opening got goods at probably the lowest relative prices they ever paid. With cotton at 22 cents they were buying at figures based on the fiber at 15. Either manufacturers who sold freely were covered for yarns bought some months before or were proceeding on the theory that it is less wasteful to keep machinery moving and mill operatives employed at a loss than suffer loss of return on capital investment and the ever-present overhead, through idleness. Few distributors were willing to split their returns as the mill men split theirs. The latter did so only under the pressure of expediency, of course; altruism steps out when business steps in.

While probably not more than 50 to 60 per cent of the underwear that jobbers were accustomed to buy for a season's requirements was contracted for, mills no doubt sold fully as much as it was safe for them to sell for future. Men's bal briggans and cotton ribbed union suits and separate garments were bought comparatively freely, but women's underwear was neglected. Several of the leading mills which usually get the cream of the men's business at and immediately following an opening, estimate that they sold approximately 75 per cent of their production. But on the other hand there are estimates by important operators in the primary market that not more than 25 to 30 per cent of an average Spring business was placed.

The sensation of the initial selling period was the withdrawal of the bal briggan lines of the Perry Knitting Co. and an advance in prices by the Wyckoff Kntiting Co. Little less sensational were the revelations, after the opening had gotten under way, that several of the large establishments had not waited for the formal showing of samples but had gone out in advance and booked a lot of business at prices which seem so low that no wise buyer to whom they were submitted could resist. There was a show of going after the customers of these two or three big establishments, with prices still lower by a trifle. A price war was nipped in the bud promptly by an intimation from, no one appeared to know where, that if it was to be a matter of value, the business which had been taken would stay taken, so to speak.

Some jobbers have yet to place their initial Spring orders. Many of these, it is expected, will not operate until they may be able to more accurately appraise cotton for the current year. Then, too, it is realized, mills named low prices at the start to be assured of enough business for keeping mills running, say, three months. Now, jobbers ask, will not these same mills be just as eager for orders after the completion of the orders on their books? If so, and cotton makes no sharp gain, these will have acquired underwear at as low prices as those who bought early. It is admitted, however, that they may have to pay more, particularly if the anticipated spurt in business materializes by the time the cotton problem reaches a solution.

That distributors did not operate to the limit in underwear for next year is not strange when taken into consideration the fact that some few have yet to make their first purchases for the coming Winter. Two or three northern mills a month or more ago advanced their prices on heavy weights, but this did not alarm jobbers. Two mills which moved prices up confess they have taken no business at the advances. They are not offering their lines, being content to wait until buyers, forced to come to market, will concede to manufacturers their right to a profit on their product. Jobbers who have sold, perhaps more than they bought, will have to buy for filling in assortments or leave retailers with the necessity of putting in other lines. Many retailers still insist they will be able to acquire all the underwear they can use, regardless of how late they call for the goods. Of some lines they can, no doubt; of others they cannot. The cost of their waiting will be, as usual, passed along to the consumer. The advantage, should any accrue, would not. The retail trade is insistent on retaining its fixed prices.

Some manufacturers have cut their goods to fit the price, without any attempt to fit the body. This is true particularly of some of the small up-start shops making nainsook underwear. This method of placating the dealer has reacted, and nainsooks have been the more demoralized item in the underwear division. So much of the cut-and-sewed has been unsatisfactory that there has ensued a stronger sentiment in favor of the knitted garments.

One underwear mill has been engaged for some time in adapting a heavy weight number of union suits to a standard, making it attractive as a dollar retailer, and recently came out with samples. Its representatives in the first few days that the line was shown booked orders aggregating approximately $80,000. The manufacturer's secret of so manipulating fabric that he could produce a satisfactory dollar combination suit was carefully guarded and even now is a secret so far as the trade at large is concerned. The new line was brought out opportunely, when there remained places in the market to be filled and prices of established lines were moving up.

Another whirlwind in underwear transactions can be imputed to a Pennsylvania manufacturer of boys union suits who during the first six months of the year operated only enough machinery to produce samples, giving little attention to putting the product on the market. On the first of July the mill was put in operation full time, and by the middle of August was sold to December.

Flat wool underwear has been one of the weaker divisions of the knitting trades. One of the old time mills, a former landmark, has disappeared, and Cohoes, N. Y., the recognized wool underwear center of this country, lost much of its industrial prestige. There has been some recovery recently, but the former bustling underwear town to which the eyes of all traders were turned is not the Cohoes of the past. Flat wool underwear for some time, it is stated in the trade, has been yielding to the ribbed, and both have suffered from high prices as in contrast with cotton goods.

A fair volume of business is being taken in sweaters of the lighter weights bordering on the novelty, for men and women. Heavy sweaters are barely moving. It is believed that, as in underwear, the trend is toward lighter weights, that the heavy garments of the past will find a market only in the very cold regions and among persons engaged in outdoor work.

Several establishments report free buying of worsted bathing suits for next year. Some jobbers were prompt

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to take advantage of spectacularly low prices, which were made possible in the main by purchases of distress yarns and changes in the garments whereby they were cheapened in cost without suffering intrinsically.

All the while that jobbers have been shy about putting goods in stock, manufacturers have been planning for a busier future, as is evidenced in the installation of certain equipment. The Berkshire Knitting Mills is asking for advance delivery of dyeing machines, and another full fashioned hosiery mill in August placed an order for two mono metal machines for dyeing. Well known makers are installing paddle type dyeing machines for the Schuylill Hosiery Mills, in Reading, and a mercerizing equipment for the Cleveland Mill and Power Co., Lawndale, N. C. The plant of this machinery company is being operated at capacity, and the company says it has sold more machines this year than in any like period in its history.

H. Brinton Company, knitting machines, also is having a steady run at capacity, many of its underwear machines having been bought for export, chiefly to England and South American republics.

The Yarn Market.

After struggling through a month consisting mostly of radical ups and downs in price, cotton yarns, in middle August, found themselves established on a level that was anywhere from two to three and four cents lower than those which were being asked for them a month previous.

Prices eased along throughout latter July at a level possibly a little higher than that existing in the early part of the month, but just before the month finished, yarns slumped generally to about the prices on which June went into history. The surprising government crop condition report on August 1, however, sent raw cotton on a trip toward the sky, and yarns consequently followed suit, 20s two-ply warps, for example, leaping from 37 and 38 cents to around 40 cents; 30s hosiery yarns picked up about two cents.

Spinners endeavored to make firm and permanent the healthier condition of rates brought about by this sudden rise, but after several days the curve started downward, bringing prices back to pre-condition report levels, generally speaking. The whole list generally for the rest of the month, up to this writing, presented no appearance of price independence, and the selling end looked forward to the extreme latter part of August for better conditions from their side of the story.

It was evident during the entire period that yarn consumers generally maintained an indifferent attitude toward yarn salesmen. Throughout the month the business transacted from day to day is to be described by the one one word, dull. Or maybe also, sluggish, hand-to-mouth, etc. Yarns moving, however, seemed to come from stocks on hand for the most part.

Buyers generally seemed not to be disturbed or influenced by the condition report of August 1st. At any rate, no great influx of buying was forthcoming, which possibly had something to do with the reverting of prices to lower levels a few days later. In some cases, and for some yarns, it is known the prospective buyers have no necessity for purchasing at this time, as their own sales are practically nil, yet in other instances, the buyers' indifference is the cause of conjecture, it being generally reported that certain classes of users would find their shelves bare of yarns if they went to the cupboard right now, and the generally conceded solution of their ennui regarding buying is that they still entertain belief of continued precipitation in prices and want to get in at the bottom.

The spinners, on the other hand, are continuously presenting their case as that of a man with his back to the wall, or a motorist with a puncture and no spare tire, although they demonstrate they sometimes are unable to fix the puncture. With considerably better price conditions for raw material, with labor and production costs reduced to the veritable minimum, they cannot see anything profitable in the quotations some of them are offering—much less what would happen if they took business at rates that would be offered by the recalcitrant buyer if he was in the market.

Hence, as the expressions are recorded, the deadlock continues, and the ultimate consumption of cotton products also continues, and yarn factors on all sides say that he is indeed fortunately situated who does not have to conjecture on the future, immediate and ultimate, of cotton and cotton yarns.

Quotations for the Philadelphia market on August 17 follow:

Single Skeins.

4s to 8s	32	10s	32½ @33
12s	33½	14s	34½
16s	35	20s	26½ @27
24s	39	26s	40 @40½

Single Warps.

8s	33	10s	34
12s	35	14s	35½
16s	26	20s	37 @38
26s	40½ @41	30s	43 @44
40s	55 @57		

Carpet and Upholstery Yarn in Skeins.

8s and 9s 3-4 slacks	33½ @34
8-2-3 tinged tubes	29 @29½
8-3-4 hard white warp-twist	23
8-3-4 hard twist waste	29

Two-Ply Skeins.

8s	32½	10s	33
12s	34	14s	35
16s	35½	20s	36½ @37
24s	39	26s	40 @40½
30s	42 @43	40s	55 @57

Two-Ply Warps.

8s	33	10s	34
12s	35	14s	35½
16s	36	20s	37 @38
24s	39 @40	26s	41
30s	43 @44	40s	57 @59

Two-Ply Combed Peeler Skeins and Warps.

8s and 16s	50	20s	52
24s	57	30s	60
40s	81½ @75	50s	82½ @85
60s	90 @95	70s	$1.05
80s	$1.10@$1.15		

Frame Spun Carded Yarn on Cones.

8s	32½	10s	33
12s	34	14s	34½
20s	36½ @37	22s	37½
24s	39	26s	40
30s	42 @43	40s	55 @57
30s double carded			44 @45
30s tying-in			37½ @39

Mule Spun Carded Yarn.

10s	49	12s	50
14s	39½	16s	40
18s	42	20s	43
24s	44 @45	26s	45 @47
30s	49 @50	40s	59 @61

Mule Spun Combed Peeler Yarn on Cones.

10s	35	12s	38½
14s	51	16s	53
18s	54	20s	56
22s	58	26s	62
28s	66	30s	68
36s	78	38s	79
40s	83 @86		

"Sensible Slasher Sentiments" is the title of a circular being distributed by Bosson & Lane, Atlantic, Mass., describing their product, Victrolyn, which it is claimed is concentrated and practically free from moisture. Victrolyn is a lubricating compound for the size bath, and is intended to displace every ingredient in the size mixture with the exception of starch and water.

Among the Knitting Mills.

R. G. Ausley, of Burlington, N. C., is investigating details preparatory to establishing a hosiery mill. Present plans involve the production of glove silk hosiery for which the fabric would be purchased and machinery for sewing, cutting and finishing would be the only machines installed.

The Holeproof Hosiery Co., Milwaukee, Wis., recently started excavation work for its proposed six-story and basement plant addition, which is estimated to cost about $70,000.

The Princeton Hosiery Mills Co., Princeton, W. Va., have been chartered by L. H. Perkins and associates with a capital stock of $750,000. The mills will manufacture hosiery.

Construction work is under way on the $150,000 unit for the Knoxville Spinning Company, Knoxville, Tenn., for the manufacture of underwear. The building will be three stories, 70 x 165 feet.

Hughes & Bradley Company, Philadelphia, is arranging a list of equipment for installation at its plant, including circular and flat knitting machines, hand frame looms, etc.

H. L. Miller and Son, Port Carbon, Pa., have construction under way on an addition to their local plant.

Star Hosiery Mills, Spartanburg, S. C., are reported to be planning an increase in capacity to increase the present output to 300 pairs of hosiery a day.

Hall Hosiery Co., Statesville, N. C., has been incorporated by W. F. Hall and others to operate the plant formerly known as Hall's Hosiery Mills.

Melrose Hosiery Mill, a new addition to High Point's industries, is now in operation at High Point, N. C., with a daily capacity of 800 pairs of hose. R. T. and Charles Amos are the owners. The mill has 50 knitting machines in operation, which number will be increased later. A dye plant and boiler room will also be constructed within a short time.

The Davis Hosiery Mills, Chattanooga, Tenn., have purchased a site adjacent to their plant to be used for mill additions. The consideration is said to be $40,000.

B. V. May, of the May Hosiery Mills, Burlington, N. C., manufacturers of seamless hosiery to jobbers, announces that the Daisy Hosiery Mills and the May Hosiery Mills are consolidated and operate under the firm name of May Hosiery Mills, Inc. In the past the two concerns have been conducted as separate organizations under the management of W. H. and B. V. May.

The Lakewood Knitting Co., 39 Debevoise Street, Brooklyn, N. Y., has filed notice of increase in capital from $10,000 to $24,000, for proposed expansion.

The Primo Knitting Mills, 961 DeKalb Avenue, Brooklyn, N. Y., has made arrangements for the operation of a local plant for the manufacture of knit goods. The company is capitalized at $10,000, and is headed by B. and R. Persky.

The Oliver Knitting Mills, Third Street, Philadelphia, Pa., has plans under way for the enlargement of plant production. New hosiery machines, ribbers, latch needle equipment, etc., will be installed.

The Dependable Knit Goods Co., Buffalo, N. Y., has been organized with a capital of $20,000, to manufacture knit goods, and a local mill will be operated. G. J. Deck and W. H. Holehouse head the organization.

The Atlas Knitting Mills, West New York, N. J., has filed notice of increase in capital from $15,000 to $250,000, for proposed expansion in mill production.

The Novelty Knitting Mills, Philadelphia, Pa., have acquired a new plant aggregating about 150,000 feet of floor space, and are planning for the early occupancy. The factory is located on Cumberland Street, extending from Third to Fourth Streets, and was purchased for a consideration of about $175,000.

The Remark Knitting Mills, Brooklyn, N. Y., have been organized with a capital of $5,000, to manufacture sweaters and other knit goods. A local plant will be operated. The company is headed by A. and Y. Kramer and J. Nathan.

The Ober Manufacturing Co., Brooklyn, N. Y., recently formed with a capital of $20,000, to manufacture hosiery and knit underwear, will operate a local plant. The company is headed by J. Biegert, R. Becker and A. Oberstebrink, Jr.

The Miller-Meinen Corporation, New York, recently organized with a capital of $250,000, will operate a local works for the manufacture of knit goods products. The company is headed by O. G. Meinen, H. Miller and C. Solomon.

The Honor Knitting Mills, Inc., 216 Federal Street, Camden, N. J., manufacturer of hosiery and other knit goods specialties, is planning for the installation of latch-needle equipment and new full-fashioned hosiery machines at its plant.

The Roberts-Rose Textile Co., New York, recently formed with a capital of $20,000, to manufacture knit goods, etc., is planning for the operation of a local works. The company is headed by D. H. Roberts, B. Rose and E. H. Lockwood, 66 Broadway, New York.

The Wald & Geller Co., New York, is planning for the operation of a local plant for the manufacture of hosiery, underwear and kindred knit goods specialties. The company was recently organized with R. Wald and O. and M. Geller, and capitalized at $100,000.

The Haral Knitting Mills, New York, N. Y., recently formed with a capital of $15,000, will operate a local mill for the manufacture of knit goods. H. and A. Tinter head the company.

Announcement has been made of the appointment of Charles E. Gradwell as publicity manager of the National Association of Hosiery and Underwear Manufacturers. Mr. Gradwell has also assumed the editorship of the "Special News Letter" of the association. He succeeds R. L. P. Reifsneider, resigned. Mr. Gradwell is well fitted for his new position with the association, having been for the past several years knit goods editor of the Daily News Record of New York. His experience in newspaper work extends over a period of sixteen years. In his recent connection he has been very intimately associated with the knitting industry and with the association's activities, and carries to his new position a thorough familiarity with the field as well as a broad acquaintance among knitting manufacturers and jobbers. The association announces plans for a decidedly broader policy of publicity to render full benefit to its members from the several new phases of work which have been started by the organization.

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ARE you apace with present day methods of dyeing and bleaching—or do you still rely on the old method of dyeing and bleaching separately?

The AUTOGYP Process of Dyeing is the most modern method known.

It does the work of bleaching and dyeing in one operation, to the exact desired shade, eliminates specks, motes, leaf and shives.

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Is Your Anti-Chlorinating Method Profitable?

Do you still use the old method of anti-chlorinating with sulphuric acid? The substitution of SULPHUROUS Acid for sulphuric acid will readily show a pronounced saving.

As an anti-chlor, the Sulphurous method is not only more economical, but it eliminates all danger of goods being damaged or tendered on dryer, and assures a uniform, neutral product.

Make your anti-chlor in the form of sulphurous acid, right in your own plant, with the MACOMB Sulphurous Acid Generator. It manufactures sulphurous acid at a cost much lower than you can secure it elsewhere. Its installation will save two washings besides a great saving in power, labor and loss of time, and allows washers to produce more.

Can be installed to deliver direct to souring machine or storage tank. It is constructed entirely of lead and is impervious to destructive chemical reaction. It is guaranteed gas-tight. Occupies only 36 sq. ft. floor space and requires two h.p. for operation.

The Sulphurous Acid Generator has proved a profitable investment for textile mills throughout the country.

Write us for complete data.

MACOMB Machine Co.

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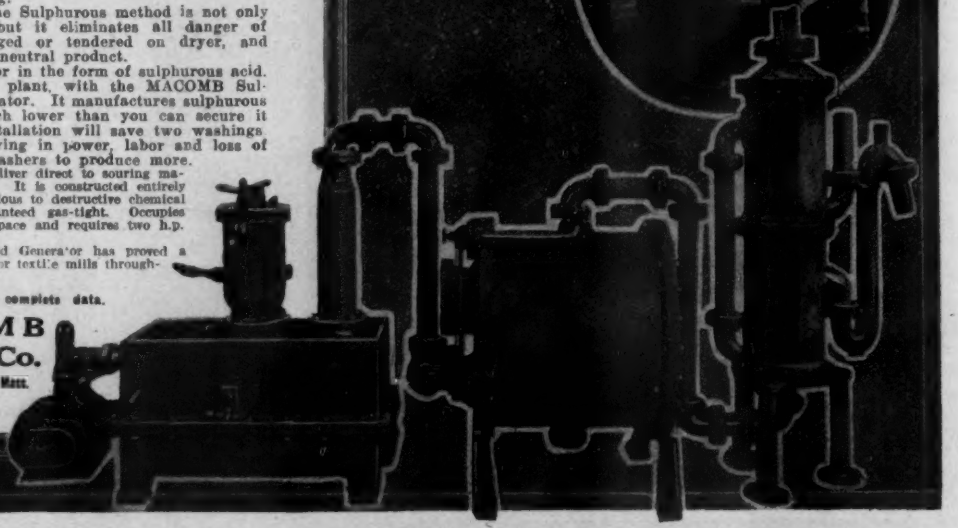

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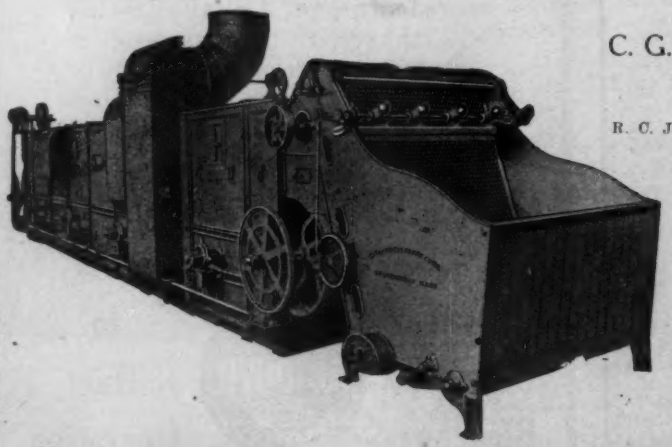
The endorsement of mills and finishing plants which stand at the head of the industry is stronger argument than anything we can say about SARGENT DRYERS.
With 50 years' specialization in dryer manufacture behind them SARGENT DRYERS duly merit pre-eminence in the drying machinery line.

They are recognized today as standard the world over.

Write today and let us explain the principles of SARGENT DRYERS. Made in models for drying cotton, linters, wool, hair, flax and any raw material.



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Sargent Dryers

In Operation Since 1859

One of our representatives recently went through a mill, down East. The manager of the plant with justifiable pride pointed out a Butterworth Calender which had been purchased and put in operation in 1859—sixty-three years of hard constant service. "And," said the manager, "it looks and runs as if it's good for sixty-three years more."

We believe, however, that there are Butterworth Machines which have been in operation longer than this. As we find them we'll be more than pleased to tell you, for you naturally want to purchase machines which will give you the most years of service.

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We will also be pleased to tell you anything you wish to know about the construction details, horsepower or floor space required by these Butterworth Machines; and to put the 102 years of Butterworth experience at the disposal of anyone interested in finishing machinery.

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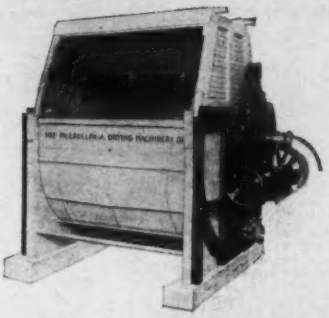

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If you dye or bleach hosiery it will pay you to investigate the many advantages of our latest type machine.

It is suitable for dyeing or bleaching cotton, mercerized, silk and artificial silk hosiery.

The tub is lined with monel and the pockets of the cylinder, which are also monel, are so constructed as to eliminate the use of dye nets, and will not tangle the goods.

Standard size machines—100 to 300 pounds.

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There are K-W machines in use which were built nearly half a century ago and which are still doing their work efficiently and economically under severe service. This is sufficient evidence of the durability and capability of K-W machines after long years of subjection to the ravages of live steam, heat and alkalis.

K-W Machinery, by its accomplishments, has steadily and irresistibly built up a reputation that has made the name "Klauder-Weldon" synonymous with the "world's best dyeing, bleaching and finishing machinery."

Our interest in upholding the K-W reputation means that you MUST be satisfied, and our suggestions to prospective purchasers are made with the view toward solving any dyeing, bleaching or scouring problem for all time. We will be glad to answer any and all questions without obligation on your part whatsoever.

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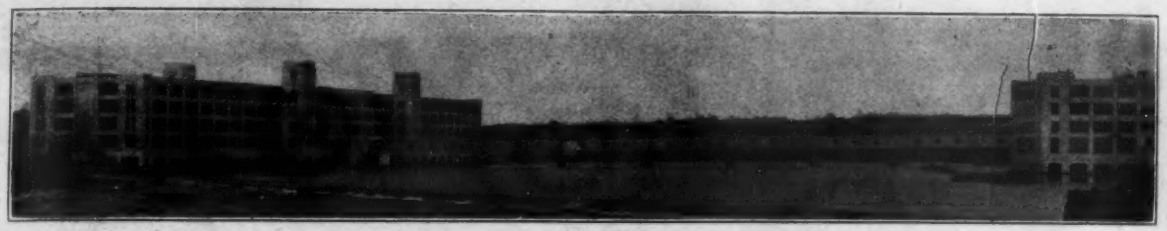

Riverside and Dan River Cotton Mills, Danville Va. Dye Plant Completely Equipped with "Proctor" Dryers

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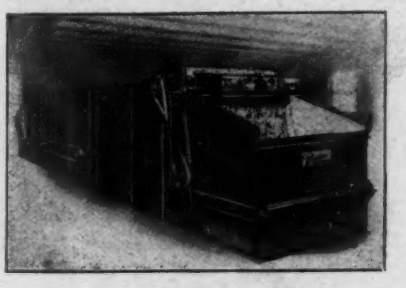
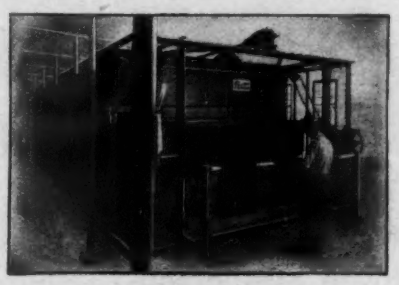


"Proctor" Automatic Dryer for dyed and bleached Cotton, Linters and all fibrous materials



"Proctor" Automatic Skein Yarn Dryer

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¶ When you need a dryer for any textile material, make sure to buy a "Proctor" Dryer.

¶ Such up-to-date plants as the Riverside and Dan River Cotton Mills, shown above, have standardized on "Proctor" Dryers. Hundreds of other modernly equipped plants have decided on these machines after thorough investigation. The number of installations is far beyond that of any other make of dryers and in every case "Proctor" Dryers have lived up to their surpassing reputation for dependability and economy.

¶ Dependability is the essence of dryer-satisfaction. Users of "Proctor" Dryers are always sure of uniformly perfect drying, output up to rated capacity, and freedom from operating troubles.

¶ You may be able to buy a lower-priced dryer than a "Proctor" Dryer, but you cannot buy a dryer that will be nearly so economical in the long run. Superior construction in every detail insures the greatest possible durability in service. Invariably the supposed saving on a lower priced dryer is swallowed by the cost of repairs, replacements and shutdowns, long before a "Proctor" Dryer would show signs of wear.

¶ You cannot go wrong in buying a "Proctor" Dryer. Every one is guaranteed as to capacity and results. Let us acquaint you with the type best suited to drying your product.

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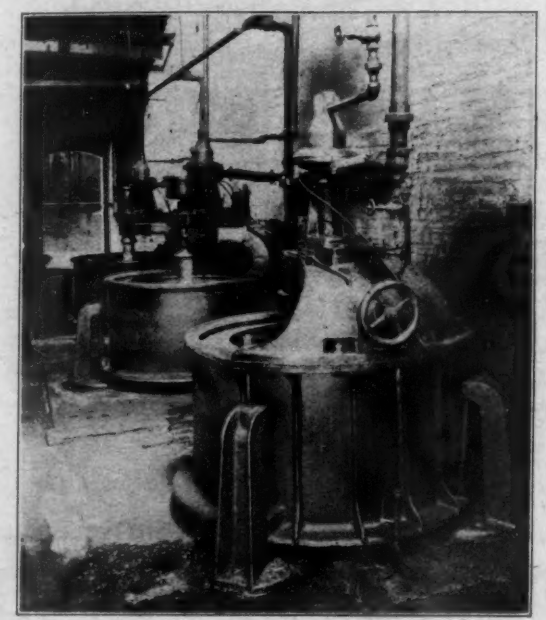
in a well-known dye plant.



The daily output of each whizzer is 5,000 pounds

of dry yarn in 8½ hours, running five loads per hour.

Each machine uses only one quart of oil each week.

The clean exhaust steam is used in the water heater, having lost only about 3% of its heating value.

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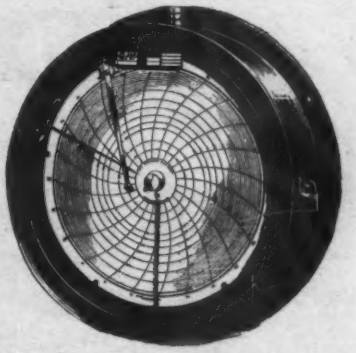

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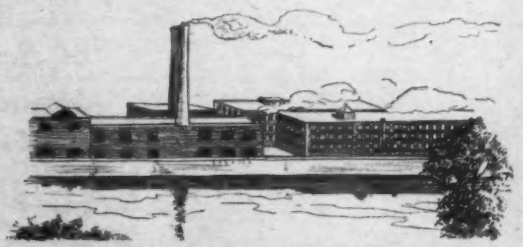

FOXBORO

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118-187

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the ideal sulphur black for hosiery

SULPHUR BLUE B.C.X. B.C.R. and B.C.G.

SULPHUR INDIGO BLUE T. I. Conc.

These products are particularly adaptable to machine dyeing because of their extreme solubility and level dyeing properties.

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The Grasselli Chemical Co., Ltd., Toronto and Montreal, Canada.

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Grasselli, N. J. *Rensselaer, N. Y.*

Established 1815

ARNOLD, HOFFMAN & CO., Inc.

Providence New York Boston Philadelphia Charlotte

All Kinds of
HEAVY CHEMICALS
Sole Agents for
BELLE ALKALI CO.
of Belle, W. Va.
Manufacturers of
LIQUID CHLORINE
BLEACHING POWDER
CAUSTIC SODA
Solid and Flaked

We solicit your inquiry for prompt or future delivery

Rohm & Haas Company

Manufacturers of

CHEMICALS

BRISTOL, PA. PHILADELPHIA, PA.

Specialties

LYKOPON — Concentrated Hydrosulphite for reducing Indigo and vat dyes.

FORMOPON—For discharge work.

FORMOPON EXTRA — For Stripping.

INDOPON W—Indigo Discharge Assistant.

TARTAR EMETIC—Technical.

Represented by

The MAKENWORTH COMPANY

Greensboro, North Carolina

Chas. Lennig & Company

Incorporated

No. 40 North Front Street Philadelphia, Pa.

Works: Bridesburg, Philadelphia, Pa.

Manufacturers of

Concentrated Sodium Sulphide

Crystal Sodium Sulphide

Bi-Sulphite of Soda Powdered

Also manufacturers of the following chemicals:

ALUM	GLAUBER SALT
SULPHATE OF ALUMINA—	OIL OF VITRIOL
Iron Free	NITRIC ACID
PAPER MAKERS' ALUM	MURIATIC ACID
WATER FILTRATION ALUM	NITRATE OF LEAD

Represented by

The MAKENWORTH COMPANY

Greensboro, North Carolina

SONNEBORN PRODUCTS

"Well Dressed Is Half Woven"

A warp properly dressed with AMALOL AND GLUANTINE saves loss in the weave room.

Everywhere these modern sizing products are used. From $500 to $3000 is annually saved —depending on slasher equipment and loom capacity.

Many customers' letters prove the point.

A New England mill manufacturing sheetings writes:

"We have very good results with your sizing preparations. They perfect the penetrating qualities of the size and reduce the dusting off in the weaving remarkably. The yarn sized with your preparations remains pliable and does not get brittle and rough. They also make a saving in the cost of the size and in slasher cloth wearing much longer than with any other sizing we ever used, proving that they are free of corrosive chemicals."

Profit by the experience of others. Test Amalol and Gluantine. 90% of our customers were satisfied with old methods until they tried our products.

Order a barrel of Amalol and Gluantine on approval—satisfaction guaranteed! Our cotton mill specialist will personally conduct practical test without obligation.

L. SONNEBORN SONS, INC.

Textile Products Division

116 Fifth Ave. **New York City**

W. D. INGLE, Southern Representative, Charlotte, N. C.
DUCKWORTH & KENDRICK, Selling Agents, Greenville, S. C.

SONNEBORN

UCPC

ANILINE COLORS

DIRECT, SULPHUR, ACID, BASIC AND CHROME
including the following new colors

DIRECT SKY BLUE T CONC
DIRECT BLUE 2 B CONC
DIRECT BLUE 3 B CONC
DIRECT FAST BROWN M
DIRECT GREEN B CONC
NAVY BLUES
DIRECT BROWN GC CONC
CORDOVANS
SULPHUR YELLOW G SUPERIOR
SULPHUR NAVY BLUE NEW
DIRECT BLACK E. U. CONC.

VELVETEEN PASTE

THE STANDARD BOIL-OFF & DYE BATH ASSISTANT

U. C. TALLOW

THE HIGHEST GRADE OF PURE SIZING TALLOW

KING BRAND SIZING

OUR "K. B." IS A COMPLETE SIZE IN ITSELF. HIGH IN TALLOW

WAX SOFTENER

A SCIENTIFICALLY BLENDED SOFTENER FOR BLEACHED GOODS

UNITED CHEMICAL PRODUCTS CORPORATION

York and Colgate Sts. . . . . Jersey City, N. J.

Southern Office, Commercial National Bank Bldg., Charlotte, N. C.

Representatives: R. T. GRANT, Charlotte, N. C.; GEO. W. WATSON, Hazelhurst, Miss.; LINSAY PADGETT, Shelby, N. C.

Beam Bleaching and Dyeing

(Brandwood's Patents)

Up to twelve Beams, Bleached or Dyed at One Operation, Indigo, Vat, Napthol, Sulphur and Direct Colors.

Cost in labor and materials guaranteed less than by any other System.

We give definite guarantees in our Contracts as to cost of labor and materials and quality of work.

Users of our Bleaching and Dyeing Plants have the exclusive free benefit of Twenty United States Patents, giving great advantages in Warping, Bleaching, Dyeing, Drying, Quilling and Splitting, and not available by any other System.

We further give the use of valuable secret processes, and many years' practical experience. We start up the Plants free, and give free service at all times.

Reckoned on basis of production, our Plants are cheapest in first cost.

We are prepared to install Plants and take payment, as and when saved by their use.

Most of the Chambrays and stripes now manufactured in the U. S. and Canada, are bleached and dyed on our Plants.

Exclusive Patent Rights are still available for some States and Territories.

Raw Stock Bleaching and Dyeing

(Brandwood's Patents)

Bleaching or Dyeing continuously in One Apparatus up to fifteen hundred pounds per hour, Indigo, Vat, Napthol, Basic, Developed, Sulphur and Direct Colors.

Dyehouse labor in handling the cotton before and after dyeing, and hydroextracting, is eliminated.

Three-fourths of the labor costs and three-fourths of the Dyehouse floor space are saved.

Spinning production considerably increased.

No shortening, weakening or matting of the cotton.

Colors brighter and evenly dyed.

We give definite guarantees in our contracts as to cost of labor and materials and quality of work.

Exclusive Patent Rights are being given to Colored Goods Manufacturers for their own State or Territory.

For full particulars apply to

JOHN BRANDWOOD

ELTON COP DYEING CO., LTD.

BURY, ENGLAND

"DEVELOPENE"

Leaves No Argument as to When
"BLACK IS BLACK"

WHY BE SATISFIED

with a RUSTY BLACK when you can have a RICH LUSTROUS BLACK by finishing your Hosiery with the latest, most efficient and satisfying patented preparation

"DEVELOPENE"

A Demonstration Will Convince You

Send us a pair of unfinished stockings, skein of yarn or a piece of fabric—cotton, silk, artificial silk, wool or mixes—which has been dyed black, washed, but not finished. We will finish it with "DEVELOPENE" and return to you.

There will be such an improvement that you will immediately want "DEVELOPENE" for finishing your goods.

No further softener—or soap—required. Makes hosiery slip on and off the board easily—leaves the product soft and pliable.

Kali Manufacturing Company

Manufacturing Chemists

1404-10 No. Front St. Philadelphia, Pa.

Sole Manufacturers of

Hydroxy Oil and Kali Chlorine Neutralizer

Uniform in Application

VICTROLYN

Penetrating, Lubricating, Dependable Assistant in Warp Sizing

KLORASENE

will remove Oil Stains.

If you are troubled, write us.

BOSSON & LANE

Manufacturing Chemists

ATLANTIC, . MASS.

JACQUES WOLF & CO.

Manufacturing Chemists and Importers

PASSAIC, N. J.

ALL FINISHING and SIZING PRODUCTS for COTTON

ANTISTAIN

MONOPOLE OIL
Reg. Trade Mark No. 70991

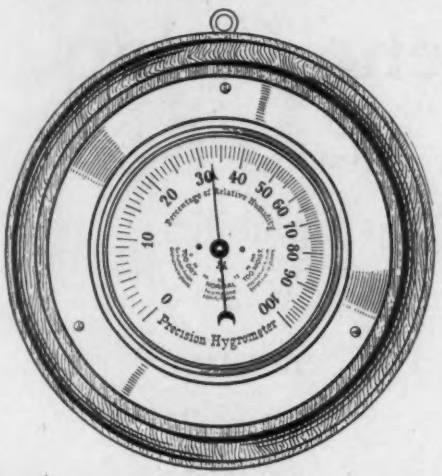
BLEACHING OIL
Kier boil Assistant

HYDROSULPHITE
For stripping and discharge printing

CREAM SOFTENERS

ALIZARINE ASSISTANTS

PRECISION HYGROMETERS



MOISTURE EFFECTS ALL YARNS

Dry air absorbs moisture from yarn, making it brittle. Watch the humidity in your mill. How does your dryer operate? Is your humidifying system doing the most for the least money? Write for folder and information.

THE B. P. MATES-BROWN COMPANY

6007 Euclid Ave. Cleveland, Ohio

"BRETON" MINEROL "F"

For
Plushes and Velvets
"It gives an oily sheen"

BORNE, SCRYMSER CO.
Established 1874
80 South Street, NEW YORK
BOSTON PHILADELPHIA
Works: Elizabethport, N. J.

SUCCESS

As success lies in doing some one thing a little better than anyone else, so, too, the success in hundreds of mills which follows the use of

WYANDOTTE DETERGENT

in obtaining clean floors, painted walls and ceilings is the direct result of using a cleaner made for this special purpose.

Indian in diamond

in every package

An order on your supply house will convince you that these results are obtained most economically, too.

THE J. B. FORD CO., Sole Mnfrs.
WYANDOTTE, MICH.

ATTENTION COTTON BLEACHERS

If you are located in New England, New Jersey or Eastern Pennsylvania, it will be worth your while to communicate with us and arrange for a personally conducted Test Boil-Out of

SOL-ESCO

A soluble, all-mineral, boiling out salt that completely extracts impurities but preserves the life and strength of the fibre. We now have a practical mill man conducting tests in Eastern Bleacheries and the improvement in feel, extraction, dyeing, evenness, and saving in time is striking.

Full Particulars on Inquiry.

The Electric Smelting & Aluminum Co.
Lockport, N. Y. Detergent Specialists.

Ciba Co. Inc.
BOSTON BRANCHES PROVIDENCE
PHILADELPHIA
COLUMBUS, GA.
CEDAR & WASHINGTON STS.
NEW YORK

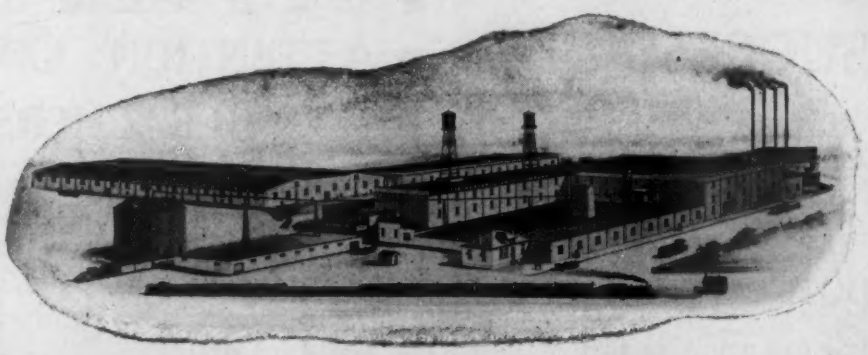
Pyrogene Colors

Suitable for Machine Dyeing
Excellent Solubility
Brilliancy and
High Concentration

Sole Representative in the United States for the
SOCIETY OF CHEMICAL INDUSTRY
in
Basle, Switzerland.

Sole Selling Agents for Dow's Indigo and Midland Vat Blues.

CBA



VICTOR MILL STARCH

The Weaver's Friend

It boils thin—it penetrates the warps—increases breaking strength and carries the weight into the cloth. Being thoroughly washed free of gluten and other foreign matter it gives a bleach and finish to the goods that you can get from no other starch.

A trial order will convince you that VICTOR STARCH has no equal on the market.

THE KEEVER STARCH COMPANY, Columbus, Ohio

Southern Agent: MR. JAMES H. MAXWELL, Greenville, S. C.

If you are not already using VICTOR STARCH call on our representative for a demonstration at your convenience.

Roller Clearer And Slasher Cloths

We are in a position to supply cotton mills with the highest quality Roller Cloths, Clearer Cloths, and Slasher Cloths to meet every requirement.

Our Roller Cloths give just the right cushion and uniform even surface to produce the best cotton yarn.

Clearer Cloth with thick strong nap that does not pull out and is of uniform length allowing complete clearance of short fibre from the rolls.

The best quality of slasher cloths having sufficient cushion and porous enough to thoroughly force sizing into the yarn.

Send us a trial order, or write us for information.

PHILADELPHIA FELT COMPANY

FRANKFORD, PHILADELPHIA, PA.

Southern Sales Agent: M. C. Sanders, Greenville, S. C.

The

VERTICO-SLANT

Lips Cannot Touch the Nozzle

The nozzle of the "Vertico-Slant" is raised slightly above the sloping base of recess which prevents the lips touching it. The copious drinking feature of the vertical stream is retained in the "Vertico-Slant," as the mouth comes in contact with the stream at a point where it loses its momentum. Prevents squirting, tampering or pilfering and uses less water than the average old style globe shaped drinking fountain.

If you have not decided in favor of drinking fountains, do it now. Write for our illustrated catalog.

RUNDLE-SPENCE MFG. CO.
MILWAUKEE WIS.

"Royal-Chicago"
PRODUCTS

No. FS22—Patented Height and Back Rest Adjustable.

TIRED OPERATORS ARE MORE EXPENSIVE THAN CORRECT FACTORY SEATING

ROYAL METAL MFG. CO.

Builders of Correct Industrial Seating.

2323-2327 S. Western Ave. Chicago, Ill.

Illustrated catalogue describing 32 different styles of steel-built stools and chairs adapted to the textile trades.

L-V-B SPOOLER TENSION

L-V-B Tension Device.

Here's What One Mill Saves

In a mill that changed from warp to filling wind on 20,000 lbs. production, the following result was obtained:

Warp Wind	Filling Wind
Stick Waste 80%	Stick Waste 60%
Spooler Waste 200 lbs.	Spooler Waste 50 lbs.
1050 doffs.	650 doffs.

Increased production 5% due to less doffing and less breakage.

Changed warp bobbins 7 1/16 to filling bobbins 8¾".

Increased speed of spooler from 800 R.P.M. to 1200 R.P.M.

Eliminated ⅓ of spoolers; also improvement on slashing, warping and weaving.

Change from Warp to Filling Wind. Try it out at our expense.

Send 2 filled bobbins and we will forward sample tension on approval.

The L-V-B Spooler Tension means greater production, better spinning and 50% Saving in Waste. Ask for a list of mills that are using L-V-B Tensions.

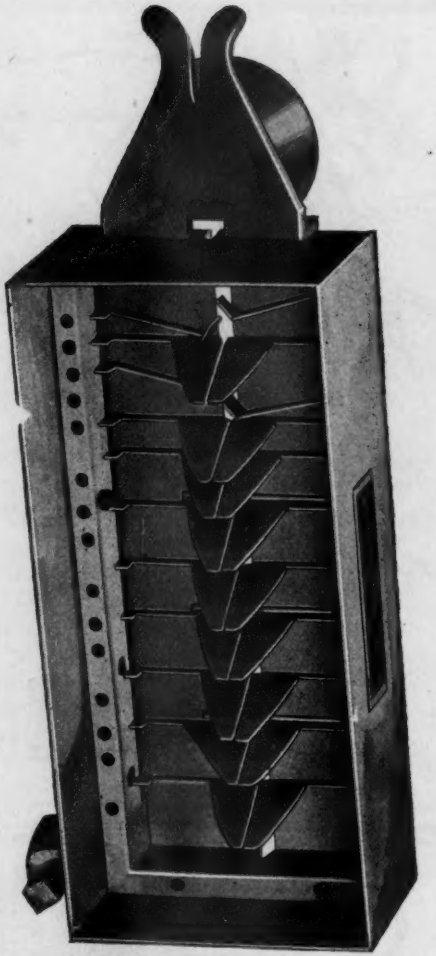
ADDRESS

Textile Specialty Company

P. O. Box 531, New Bedford, Mass.

A. B. Carter, Southern Agent,

L-V-B Tension Co., 210 Realty Bldg., Gastonia, N. C.



The Eclipse

AUTOMATIC YARN CLEANER

An entirely new principle is involved in that the yarn is cleaned by **flexible** blades which vibrate **constantly.** This device is small and compact and **easily** attached. The strength and elasticity of the yarn is not affected in the slightest.

When writing, state make of spooler or winder.

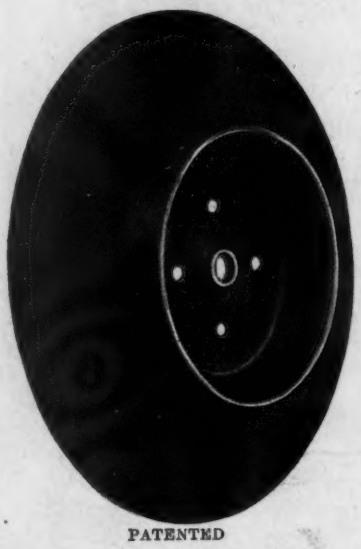
ECLIPSE TEXTILE DEVICES, INC.

ELMIRA, N. Y.

Makers of
Automatic Yarn Cleaner
Automatic Stop Motion
Yarn Tension Device

All Steel Loom and Section Beam Heads

Mill Executives are Specifying All Steel Heads on New Equipment.



PATENTED

STEEL heads represent permanent equipment. The first cost is the only cost.

Once installed all expense of maintenance is eliminated.

GUARANTEED not to bend or spring under pressure of warp or handling of beams. Constructed to duplicate present cast-iron heads.

Ask for samples.

PATENTED

Mossberg Pressed Steel Corporation

Attleboro, Mass.

Southern Representative:
Southern Textile Specialty Co., Greenville, S. C.

THE BELGER CO., BOSTON, MASS.

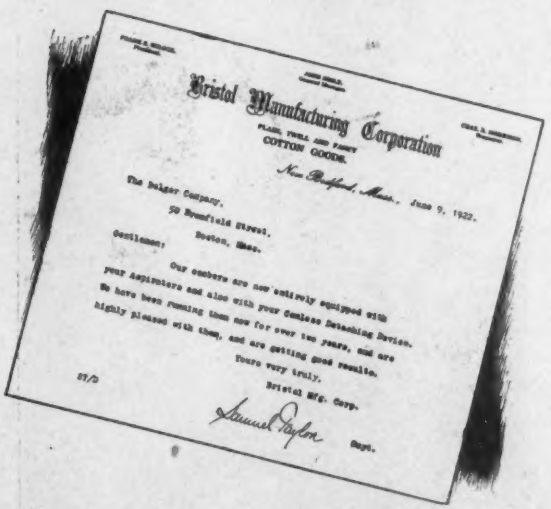
FORMERLY J. WEINBRENNER & CO.

Roth's Pat. Improved
ASPIRATORS
and Roll Waste Packers
for ALL MAKES OF
COMBERS

BETTER COMBED and
CLEANER SLIVER

SAVINGS in
WAGES,
HALF LAPS
AND BRUSHES.

WASTE of same good quality as with old doffer arrangement.



Bristol Manufacturing Corporation

PLAIN, TWILL AND FANCY
COTTON GOODS

New Bedford, Mass., June 9, 1922.

The Belger Company,
50 Broadfield Street,
Boston, Mass.

Gentlemen:

Our combers are now entirely equipped with your Aspirators and also with your Camless Detaching Device. We have been running them now for over two years, and are highly pleased with them, and are getting good results.

Yours very truly,
Bristol Mfg. Corp.

Samuel Taylor Supt.

S/D

PATENTED CAMLESS
DETACHING MOTION
for NASMITH Combers.

INCREASED
PRODUCTION

with same good quality of combed sliver for which the Nasmith comber is so well known.

LESS POWER,

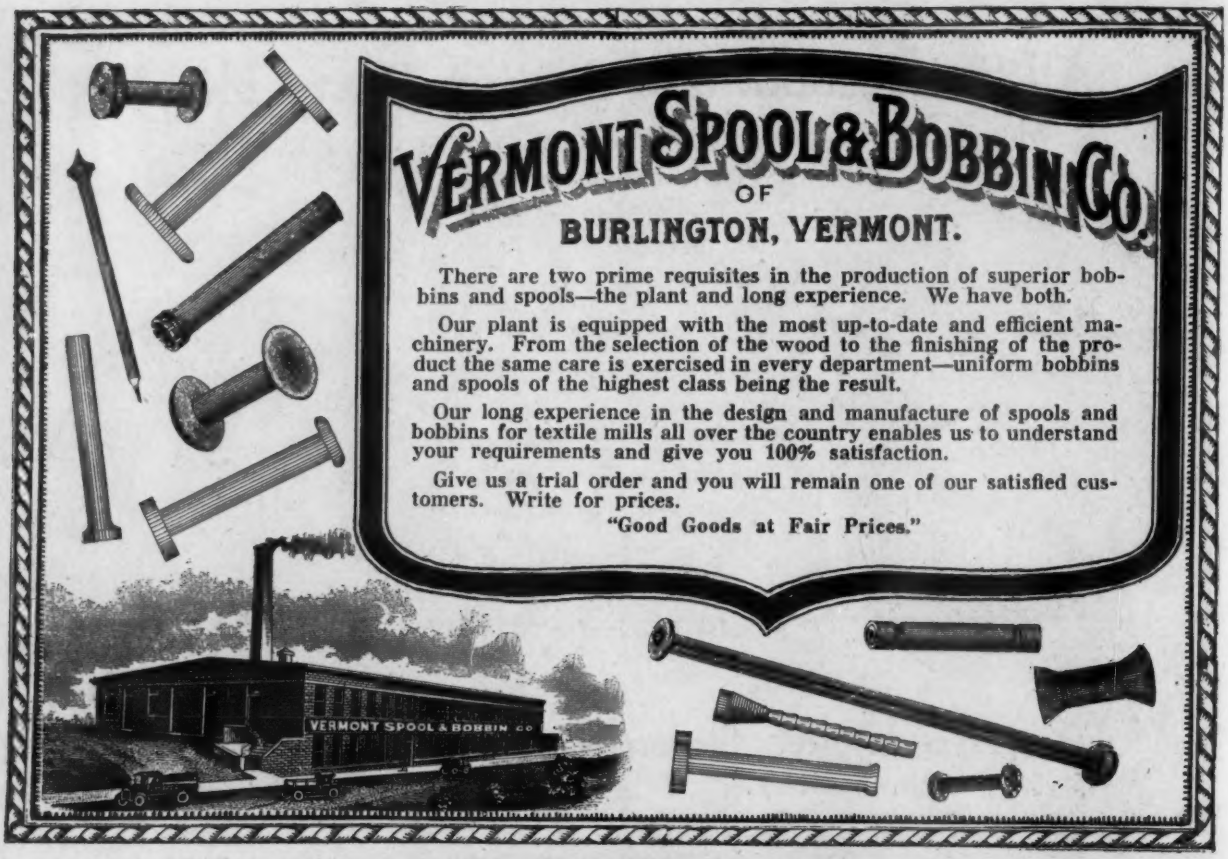
SIMPLIFIED
SETTINGS and
ADJUSTMENTS.

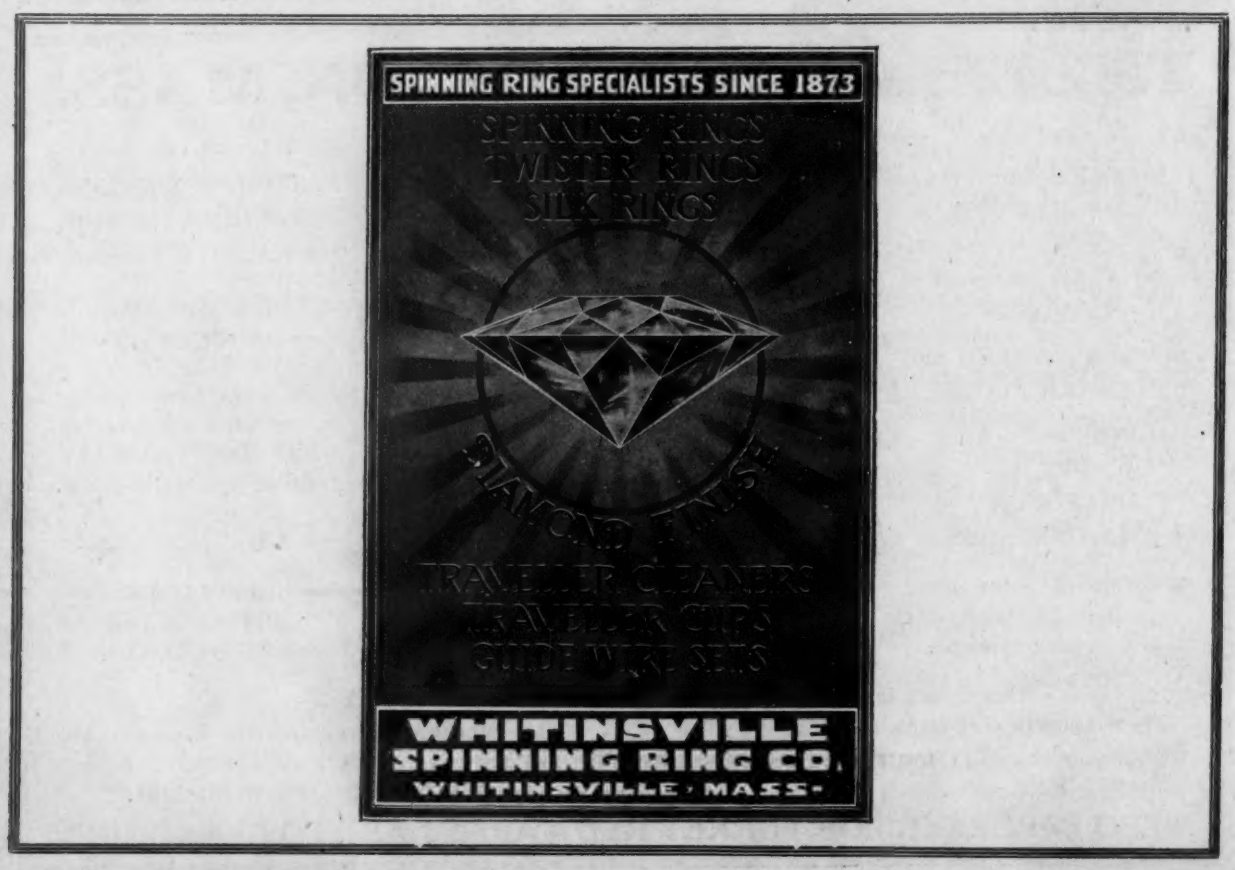
WASTE is drawn direct from brush to perforated cylinder.

WASTE delivered separately for each comber head.

NOISELESS WORKING—
This mechanism replaces the big cam, the quadrant and pinion, clutch, clutch operating cam and lever of the present machine.

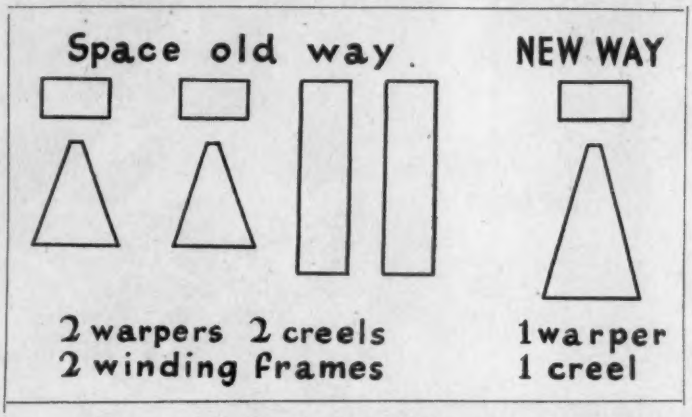
ALSO IMPORTERS OF TURKEY RED YARNS FAST TO BLEACHING


VERMONT SPOOL & BOBBIN CO.
OF
BURLINGTON, VERMONT.
There are two prime requisites in the production of superior bobbins and spools—the plant and long experience. We have both.
Our plant is equipped with the most up-to-date and efficient machinery. From the selection of the wood to the finishing of the product the same care is exercised in every department—uniform bobbins and spools of the highest class being the result.
Our long experience in the design and manufacture of spools and bobbins for textile mills all over the country enables us to understand your requirements and give you 100% satisfaction.
Give us a trial order and you will remain one of our satisfied customers. Write for prices.
"Good Goods at Fair Prices."
VERMONT SPOOL & BOBBIN CO.


SPINNING RING SPECIALISTS SINCE 1873
SPINNING RINGS
TWISTER RINGS
SILK RINGS
DIAMOND FINISH
TRAVELLER CLEANERS
RAVELLER CUPS
GUIDE WIRE SEATS
WHITINSVILLE
SPINNING RING CO.
WHITINSVILLE, MASS.

NEW AUTOMATIC CREEL

for direct warping from FILLING WOUND BOBBINS



COMPLETELY ELIMINATES the

Spooling of the yarn

Spooling waste

Undue and irregular tension of yarn due to spooling

Stoppage for doffing

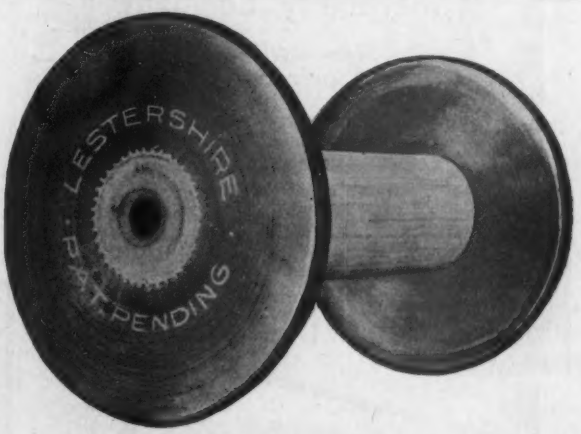
Doffing is done while warper is running.
Greater production from better warps at lower cost.
Better loomage from auto-creel warps because
Elasticity is preserved in yarn.

For information address

AUTO CREEL CORPORATION, NEW YORK

Room 915, Fifth Ave. Building
Alfred Suter, Sales Manager

What Part of the Spool is First to Wear Out?



Your superintendent will confirm our statement that 99% of all Warper, Twister or Spooler Spools become useless on account of the heads breaking, wearing rough or loosening. This is true of all types of Spools heretofore on the market.

With the Lestershire Type Vulcanized Fibre Head Spools just the opposite is true. The Heads will outwear the barrels because Hard Vulcanized Fibre (the same material from which end thrust bearings and automobile gears are made) will never break, wear rough nor splinter.

Of course the first cost is higher but, figuring your charges per thousand spools per year, they are by far the most economical spools on the market today.

In addition Lestershire Fibre Head Spools will in the ordinary mill give you an increased unloading production of nearly 50%. Put a row on your creel and compare the time necessary to unload with any other type Spool.

On the smooth Rock Maple barrel, cleanly jointed to the Fibre Heads which cannot get rough and cannot be dented, there is no place for the yarn to catch.

Spindle wear is also eliminated by bushings of hard well seasoned Dogwood.

Increased traverse can be had which will give you greater yardage on your spools. This means a saving of many dollars in the course of a year, not only direct but in labor required to change the spools.

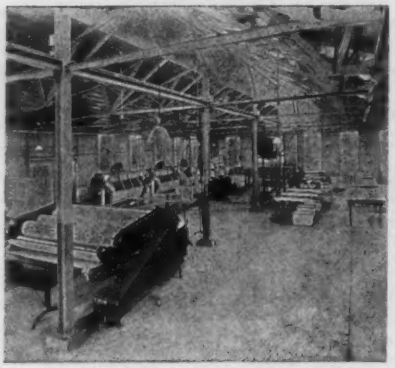
At your request we will gladly send samples for purposes of test and comparison.

LESTERSHIRE SPOOL & MFG. CO.

Manufacturers Mill Spools, and Bobbins, of Every Description

JOHNSON CITY, N. Y.

THE AMERICAN MILL VILLAGE LAUNDRY



General View of a Mill Village Laundry suitable for a large sized plant. Planned and equipped by The American Laundry Machinery Company.

An American Mill Village Laundry is a simple, yet complete installation of modern laundry machinery for handling the laundry work of mill employees. It eliminates lay-offs, lessens labor turnover—and pays you a fair profit besides.

The American Laundry Machinery Company

Specialty Dept. C.
Cincinnati, O.

Canadian Office,
The Canadian Laundry Machinery Co., Ltd.,
47-79 Sterling Road, Toronto, Ontario, Can.
Representatives in Great Britain,
American Laundry Machinery Company, Ltd.,
36-38 Victoria St., London, S. W. 1—England.

The American Laundry Machinery Co.,
Specialty Department C,
Cincinnati, Ohio.
Gentlemen:
Send me complete details about American Mill Village Laundries for Textile Mills. It is understood this involves no obligation to myself.
Name .....
Firm .....
City ..... State.....

Send the Coupon for full information

For Every Textile Need We Make a Suitable Brush

Every department of the cotton mill has a special brush requirement, a brush that is better suited for that particular work than any other.

We are makers of textile brushes, know what is needed, what style is best suited, what bristle is most satisfactory, how the handle should be shaped for comfort and convenience, as well as other details of brush construction.

With that knowledge of the business, and facilities for economical and speedy production, we are in position to give not only prompt service, but *quality* of the highest order.

Atlanta Brush Co.

Atlanta, Ga.

This Wooden Rack Cost $46.05 —

They thought steel would cost too much!!

Because of an erroneous impression regarding the cost of steel, a firm who, needing a storage rack, built one of wood, 16 feet long, 10 feet high and 2 feet deep.

After it was built they found that some of the compartments were four times too large—others not large enough. But they could not change it. Wooden racks cannot be adjusted.

Now, they need more space but the only way they can get it is to rebuild the rack or "cobble up" a top story. They will want to move in about a year and the rack will be a total loss.

Only a little more for steel would have made this rack perfectly adjustable, easily extendable, readily portable—with greatly increased capacity.

Any rack you build you will want to change, add to, or move. This can be done economically only with steel.

LYON METALLIC MFG. CO.

AURORA, ILLINOIS.

District (Sales) Offices

New York Chicago Philadelphia Pittsburgh Cleveland
Boston Detroit Los Angeles Rochester
There is an Authorized Agent near you. Write for his address.

LYON STEEL PRODUCTS

One of the "Sunshine" Bakeries of the LOOSE-WILES BISCUIT COMPANY Kansas City, Mo. where clean floors help to make clean Sunshine Biscuit and Vassar Chocolates.

The New Standard of Cleanliness!

CLEAN FLOORS! Business as well as the home, now demands them!

For its influence on employees, on patrons, on product, on *profits*, the business man can no longer ignore the problem of CLEAN FLOORS. There are no degrees of cleanliness. Floors are CLEAN —or they are not clean. As long as grime, grit or soap film remains in cracks, corners or on the surface—the floors are *not* CLEAN.

Hand scrubbing—even if done daily—is not satisfactory. If done cheaply, it is only half done. If well done, it is too costly.

It requires *electrical* scrubbing to produce CLEAN FLOORS economically and effectively. Electricity, which already does your loading, lifting, hauling and a hundred other irksome jobs, will do your scrubbing—at a saving in labor and time cost.

"Electrical Scrubbing" Free to Executives.

This interesting, illustrated brochure on the application of electricity to scrubbing sent on request. Simply have your secretary fill out and mail memo.

AMERICAN SCRUBBING EQUIPMENT CO.

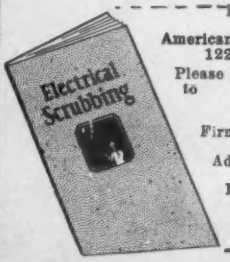
General Offices and Factory
HANNIBAL, MO.
District Offices in Principal Cities.

"Clean Floors Reflect Clean Business"

FINNELL SYSTEM

OF ELECTRIC SCRUBBING

Ten Years in Successful Service.

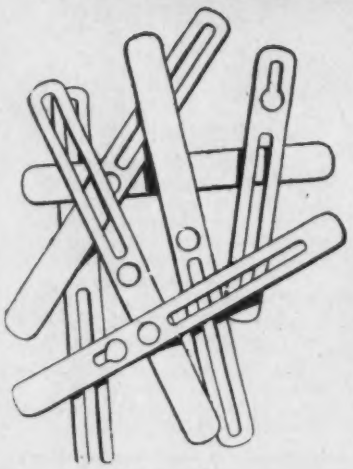


EXECUTIVE'S MEMO.

American Scrubbing Equipment Co.
1229 N. Collier St., Hannibal, Mo.
Please send brochure "Electrical Scrubbing" to

Firm Name .....
Address .....
Individual's Name .....
Title .....

GREIST



Satin Finish Loom Drop Wires
are *Good Wires*

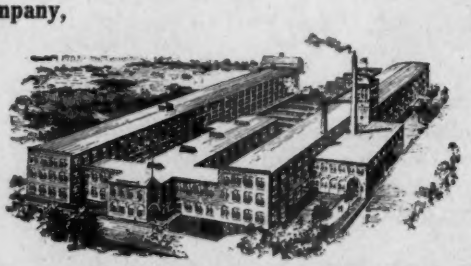
Uniformly made—free from burrs
a reliable source of supply.

The Greist Manufacturing Company,

Dept. "C,"

New Haven, Conn.

Southern Representative
The G. G. Slaughter Machinery Co.
Greenville, S. C.



"Everlastingly on the Job"

FROM sun-up to sun-down, and far into the night when necessary, SHAMBOW Shuttles keep "everlastingly on the job." Every part of a SHAMBOW Shuttle is made under our own roof and measurements, spindle fit, etc., must be in exact accord with our customers' specifications and requirements.

Each SHAMBOW Shuttle passes a close final inspection, and in every detail must reach the "SHAMBOW Standard" to get by.

Insist on a shuttle of genuine "SHAMBOW Standard" and be assured that

Your shuttle bill will be smaller.
Your interruptions will be fewer.
Your production will be greater.
Your product will be better.

"HEART of the LOOM"

SHAMBOW SHUTTLE COMPANY
Woonsocket, R. I., U. S. A.
JOHN C. SHAMBOW, Pres.

Shambow
—the Custom Built Shuttle

YOUR SPINNING FRAMES

The plumbing of your Spindles is also very important. If the Spindles are bent they should be straightened, as a crooked Spindle cannot be properly plumbed.

For the past twenty-five years we have been **Repairing Spinning Frames.** The troubles of the Spinning Frame are among the most important leaks in the mill.

The proper lining and leveling of the frames will add longer life to the rolls, gears and the frame in general.

We have a large number of mills who have us make regular yearly inspection of their Spinning Frames. This keeps them in the highest state of efficiency—which means increased production and decreased expense.

Our Expert Mechanics Are at Your Service in the Repairing of Your Spinning Frames—Better Write Today.

We Are Equipped to Duplicate Any Style Flyer Presser—Catalog on request.

Southern
Spindle & Flyer Company
CHARLOTTE, N. C.

Manufacturers, Overhaulers and Repairers of Cotton Mill Machinery
W. H. MONTY, Pres. and Treas. W. H. HUTCHINS, V.-Pres. and Sec.

SPUR-CAP SHELLS

Made to Stand the Hard Knocks

MANUFACTURED BY

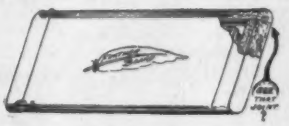
GALLAUDET AIRCRAFT CORP'N.,

EAST GREENWICH, R. I.

Pat. Applied for

FEATHERBOARD

The Master Cloth Reel

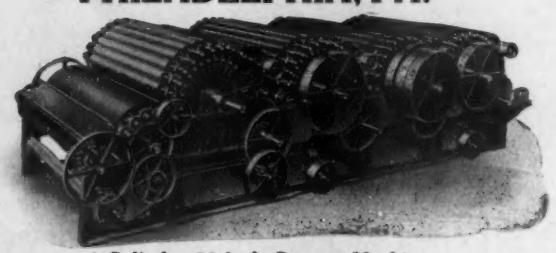


LIGHT AND STRONG. IMPROVES YOUR PUT UP.

SMITH & FURBUSH MACHINE CO.

PHILADELPHIA, PA.

A Garnett Machine of this size will reduce to fibre hard twisted thread waste without materially shortening the staple. We also build smaller machines for working soft wastes.



4 Cylinder 30-inch Garnett Machine.

This Garnett is built on our sectional unit frame construction and contains many improvements which we will be glad to explain.

Ask for Circular S-182.

BEST —

1. for handling yarns in skeins, on spools or cones, and transferring from ribbing and knitting departments.
2. for shipping yarns finished or unfinished.
3. for special routing of yarns or stock through various departments.
4. for storage (without casters).

We have never failed to save money for the mill when a textile handling problem was put to us. Lay your problem before us and we will gladly offer suggestions. Write today for our "Bulletin on Trucking in Textile Mills."

G. B. LEWIS COMPANY

BOX TRUCK DIVISION C-15

WATERTOWN, WISCONSIN

John Cronin, 13 Hamilton St., Boston, Mass.; Mill Specialties Co., 439 Arch St., Philadelphia, Pa.; W. Gracey Co., 230 Broad St., Spring City, Pa.; E. C. Buehrer Co., 18 Front St., San Francisco, Cal.; J. D. Collins Sales & Engineering Co. 55½ Luckie St., Atlanta, Ga.; R. E. Stanton Equipment Co., 615 Ryan Annex, St. Paul, Minn.; R. R. Street & Co., 28 N. Clinton St., Chicago, Ill.; Edw. L. Koehnig Co., 23 W. Kinzie St., Chicago, Ill.—Detroit address—Ryerson Bldg.—Milwaukee address—114 Grand Ave.—Alvin Lovingood Co., 14 Walker St., Atlanta, Ga.

LEWIS Box Trucks

Count— Don't Compute

When weaving woolen, cotton, silk, or even bags—*count* the picks. If they are counted by the Productimeter, you will *know exactly* what the true total is, all the time. *Absolute accuracy* in counting eliminates possible mistakes and disputes over output.

The Productimeter

Install one thirty days at our expense. Let the Productimeter show you just what *counting satisfaction* is!

Write for our catalog now.

DURANT Manufacturing Company

633 Buffum St. (1567) Milwaukee, Wis.

FIFTH SOUTHERN TEXTILE EXPOSITION TEXTILE HALL

Greenville, South Carolina
October 19th to 25th Inclusive

Will open at ten o'clock Thursday morning, October 19th, will be closed Sunday, and re-open Monday. It will end Wednesday night, the 25th.

This exposition is one of the most important events of its kind in the world. The South spins and weaves a large portion of the earth's production of cotton.

Here will be seen textile machinery, devices, appliances and supplies. No manufacturer can afford not to be informed of the latest inventions, improvements and equipment. The superintendent, overseer or secondhand who misses this show will be handicapped in performing his work. Every mill operative, who can possibly do so, should visit it.

Numbers of mills consider payment of expenses of principal employees to and from the show a good investment.

It will require several days to see all the show. One day, however, is better than none.

We invite all who have an interest in the industrial development of the country to attend.

TEXTILE HALL CORPORATION

THE

"Southwestern Iron Clad"

Is the IDEAL Cotton Mill Broom

Only the best grade of broom corn is used in these brooms—they are built strong and will withstand the hardest usage.

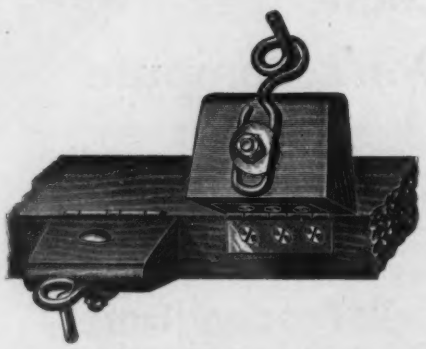
The light weight, yet strong and substantial shields used gives the broom ample protection and at the same time allows the proper amount of broom corn to be used, thus giving them excellent sweeping qualities.

MADE RIGHT!
PRICED RIGHT!

Inquiries and orders receive prompt attention.
Sold direct and through
all principal distributors.

The Southwestern Broom Mfg. Co.
Evansville, Indiana

The Palmer Adjustable Thread Guide



For Ring Spinning and Twisting Frames

Easily Adjusted.

Extreme accuracy and permanence of setting.

Cheapest of them all.

Mail guide-block for free sample.

Patented and manufactured by

THE I. E. PALMER COMPANY
Middletown, - - - Connecticut

AMERICAN
SUPPLY COMPANY
PROVIDENCE, R. I.

MANUFACTURERS OF
Loom Harness,
Weaving Reeds,
Oak Tanned Leather
Belting, Strapping,
Etc.

We make a specialty of Harness for Warp Drawing Machines

NOTE—No orders too large for our capacity.
None too small to receive careful attention.

And Now Comes the Halsey-Taylor Automatic Stream Control

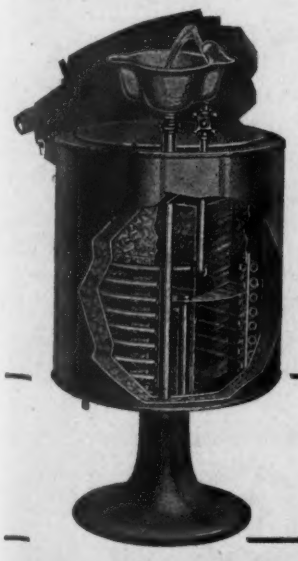
The Halsey-Taylor Perfect drinking stream has never had an equal. Two streams of water, rising from the side of the fountain at an angle, converging as they rise, form a perfect drinking mound. Drinking from this mound is a comfort—it is sanitary to the highest degree for saliva and waste water cannot come in contact with the source of the stream.

And now comes the Halsey-Taylor Automatic Stream Control, a simple, fool-proof device, fully concealed, that maintains a constant even pressure regardless of the pressure in the lines—the stream is NEVER TOO HIGH—NEVER TOO LOW. No more splashing of water in the drinker's face—no more time wasting trying to get the stream under control to drink in comfort—these disadvantages long experienced are entirely overcome.

Halsey-Taylor Cooler Fountain

Puritan "Cantonment" Coolers are designed to connect to pressure lines and are so constructed that the drinking water does not come in direct contact with either the ice or ice water, but is circulated through brass coil which is tinned both inside and outside.

With 2-stream "Mound Building" Projector this cooler is the most efficient and sanitary of its kind on the market.



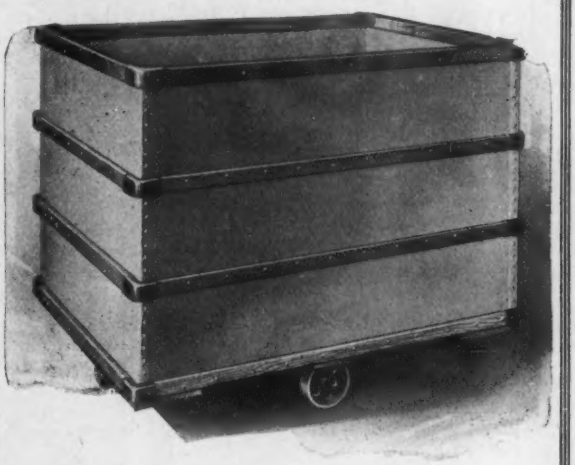
Install Halsey-Taylor Fountains for your own economy and for your employees' comfort.

Write for full descriptive literature.

The Halsey W. Taylor Company
No. 538 North Park Ave.
Warren, Ohio

Puritan CANTONMENT DRINKING FOUNTAINS

The Fountain with the Perfect Drinking Stream



Keystone Fibre Warehouse Cars

The lighter car that gives you more years of service.

Made of Keystone Fibre—the fibre that's tougher, harder and more durable.

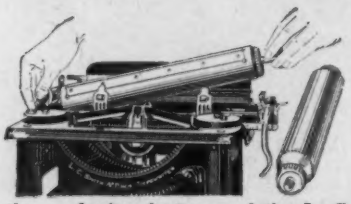
Stronger than cars made of fibre twice the gauge—and easier to handle.

Orders filled through any responsible mill supply house, or direct. Send for catalog of mill supplies.

Keystone Fibre Company
Box 346 Yorklyn, Delaware

Southern Representative: Wilson Company, 408-409 News Bldg., Greenville, S. C.; New York Office: 30 Church St.; Chicago Office: 565 West Washington Blvd.; Philadelphia Office: 7 South 17th St.; Boston Office: 176 Federal Street.

Interchangeable Platen



One of the exclusive features of the L. C. Smith & Bros. typewriter is the interchangeable platen.

With the use of no tools except the fingers, platens of different degrees of hardness can be inserted. There is the regular platen, the medium, the hard, and the brass platen, depending upon the number of copies desired.

Then there is the card-writing platen and the label-writing platen.

It is economical to have platens of different degrees of hardness, because a soft platen, which is used for ordinary correspondence, with one or two carbon copies, is much easier on ribbons, carbon paper, on the mechanism of the typewriter and on the nerves of the operator, as well as being much more quiet.

It is a great advantage, therefore, to be able to take out a hard platen, after it has been used for a special purpose, and insert the softer platen for regular work.

Ask for folder, "Many in One."

L. C. Smith & Bros. Typewriter Co.

Home Office and Factory : SYRACUSE, N. Y.

Branches in all Principal Cities

Save time distributing papers

Kleradesk

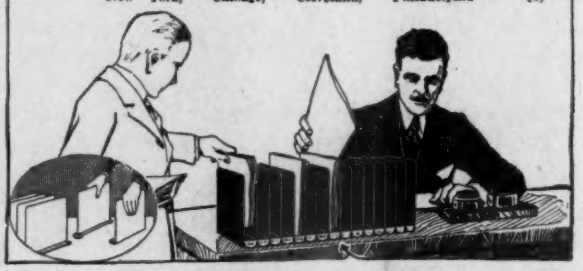
Automatically sorts and routes mail, memos, orders, etc., for all to whom mail is distributed. It holds reference papers immediately at hand when needed. Very convenient.

A Steel Sectional Device

Add compartments as required. Sections $1.20 each. Fifteen-compartment Kleradesk illustrated below only $19.20. Indexed front and back. Write for free, instructive folder, **"How to Get Greater Desk Efficiency."**

Ross-Gould Co., 318 N. 10th—St. Louis

New York, Chicago, Cleveland, Philadelphia (8)



PRINTING

WE do it for some of the largest mills in the South—*Why not for yours?*

If our prices and service were not right, we could not do it.

THE A. J. SHOWALTER COMPANY

Dalton, Georgia.

ESTABLISHED 1887

BYRD PRINTING CO.

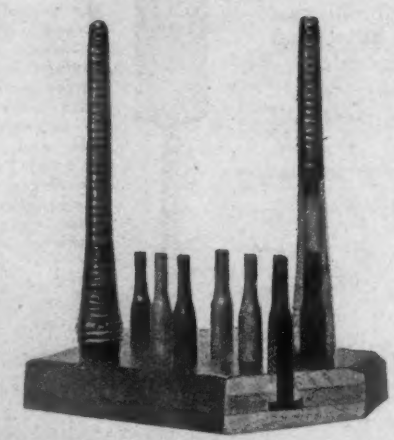
46-48-50 W. Alabama St. Byrd Building

Atlanta, Ga.

Offers experience, equipment and service to its patrons which are unexcelled by any printing plant in the country. Special forms for factories and mills solicited. Prompt deliveries, splendid service and perfect satisfaction in every detail guaranteed. A trial order will make you a regular customer.

Try Us Once!

WASHBURN KORE-LOKT PIN BOARDS



"The Old Bobbin Boxes are going"

This cut shows a type of pin board construction which has successfully replaced bobbin boxes on looms.

There is a "Kore-Lokt" Pin Board to fit every textile need. Other styles are fitted with hollow or solid steel pins, with wire pins and with special wood pins, but in every type the Kore-Lokt principle is retained.

Be modern. Always consider your doffing problems in terms of pin boards. They are indispensable in measuring and controlling the operation of automatic looms. They answer every doffing requirement throughout the mill.

We invite superintendents and overseers to correspond with us concerning pin board systems. Let us send you a list of prominent mill users, each and every one of whom considers pin boards an essential factor in their success.

NEW BEDFORD MASSACHUSETTS

Meeco
Metal Equipment For Shop And Factory

DRINKING FOUNDAINS

The Standard for 15 Years

Fig. 604 ICE-COOLED

Eleven Other Types From Which To choose

SANITARY—DURABLE—EFFICIENT—LOW IN COST
Write for catalog and new price list.

MFG. EQUIPMENT & ENG. CO.

FRAMINGHAM, MASS.

SAVOGRAN

Cleans Floors Thoroughly and Economically

Sent on Trial

INDIA ALKALI WORKS

BOSTON, MASS.

VOGEL PATENTED

FROST PROOF CLOSETS

They require no pit.

They save water.

All bowls have enameled rims. In service daily, winter and summer.

No. 1

OVER 350,000

Giving

Satisfaction in

All Climates

The ideal water closets for Factories and Mill Villages, where thousands have been installed.

The most durable water closets made — excepting none.

Every Fixture Tested Under Hydraulic Pressure Before Leaving Factory.

INSIST ON GETTING THE VOGEL

Ask your jobber

JOSEPH A. VOGEL CO.

Factory and Office at

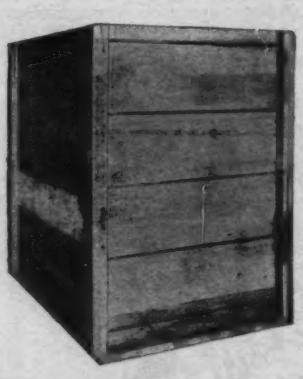
WILMINGTON, DEL.

VOGEL PATENTED

No. 5 FACTORY CLOSET

This fixture fills the demand for a strong and durable automatic water saving closet outfit for factory use. The valve device is extremely simple and repairs, though seldom necessary, can be made by removing the valve cap back of bowl.

No. 5



Cypress Tanks
Wooden Packing Cases
ALL STYLES

Manufactured from

GEORGIA PINE POPLAR CYPRESS
WHITE PINE and GUM

Your Inquiry Solicited

Hightower Box & Tank Co.

Corner Humphreys and Glenn Streets

BOX 1025 ATLANTA, GA.

"Cotton Mill Machinery Calculations"

EVERY Textile Man should have these reference books. They cover in a detailed and thorough manner all calculations necessary to be made on any cotton mill machinery manufactured in the United States and constitute one of the best references on the subject obtainable.

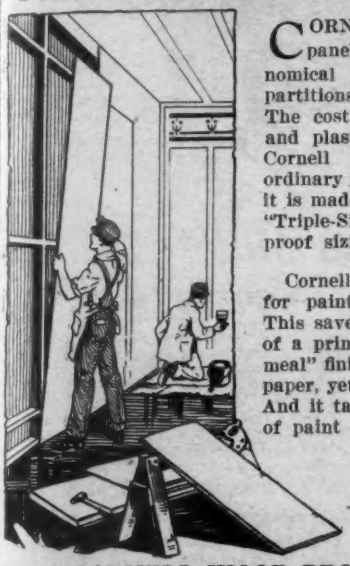
The two volumes are illustrated with 45 diagrams and contain 21 reference tables.

As the value of a book lies in its contents and not in a fancy cover, we have put these two volumes out in a strong, serviceable binding. You can secure them in conjunction with a subscription to COTTON.

Write for circulars and full information.

Cornell Wood Board

FOR WALLS, CEILINGS and PARTITIONS

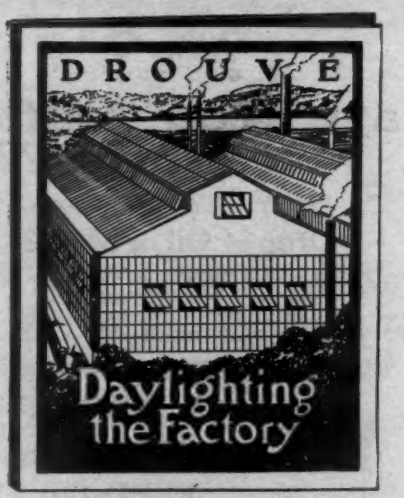


CORNELL-WOOD-BOARD panels make the most economical walls, ceilings and partitions for mill-housing. The cost is lower than lath and plaster or plaster-board. Cornell lasts longer than ordinary wallboard because it is made of pure wood fiber, "Triple-Sized" with moisture-proof sizing.

Cornell comes all primed for painting—"Mill Primed." This saves the labor and cost of a priming coat. Its "Oatmeal" finish rivals costly wallpaper, yet costs nothing extra. And it takes a perfect spread of paint or calcimine.

Send for Sample.

CORNELL WOOD PRODUCTS CO.
GENERAL OFFICES: 190 N. STATE ST., CHICAGO
Water Power, Mills and Timber Lands in Wisconsin



Look Into It!

Perfect lighting of the mill interior is today, more than ever, an economic necessity, and of all lighting, natural daylight is the best and cheapest.

If you are contemplating changes in your mill, new additions or a new mill construction, look into the matter of skylights. This interesting booklet tells how skylight roofs can be made as substantial as any other roofs, how glass breakage has been eliminated and corrosion prevented, how better lighting and more perfect ventilation is assured, illustrating many installations, and containing other data of value to the mill man.

A copy should be in every mill man's file. Write for your free copy today.

THE G. DROUVE CO.
BRIDGEPORT, CONNECTICUT

A Mill White That Cements Itself To the Wall

With its aggregate of WHITE Portland Cement, ZEMCO-LITE cements itself to walls and ceilings. It depends entirely on cement for its adhesive qualities and not upon gums and glues, which decompose.

A ZEMCO-LITE wall is a pure white semi-flat finish which stays white, never discoloring, and because of its wonderful light refracting properties it renders any interior perfectly lighted and free from glare. It sets in a hard coating too smooth to catch lint or mill dust. It defies steam, moisture or any acid fumes, and is fire-resisting and sanitary.

Zemco-lite

TRADE MARK

"The Cement Paint"

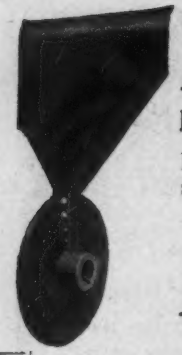
If you want a durable mill white that will not chip, peel, blister, crack or fall on fabrics and machines—ZEMCO-LITE is what you are looking for.

We also manufacture paint for exterior work, on mills, villages, whether brick, wood, stucco, iron or concrete. ZEMCO-LITE sticks and stays. Made in various colors to meet your requirements. Write us for details on ZEMCO-LITE mill white and also for color card on exterior painting.

American Cement Paint Co.

Chattanooga,

Tenn.



ELIMINATE

Long Breakdown Troubles

By equipping your mill with the sturdily built, easily accessible

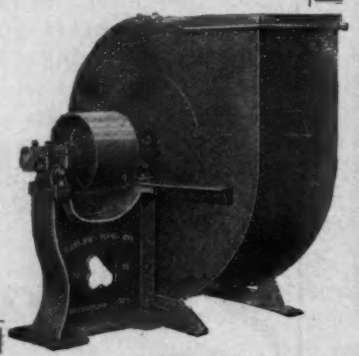
Bayley "B"

EXHAUST FAN

Individual, uniweight floats riveted onto (not cast into) the perfectly balanced, accurately machined hub. To replace accidentally damaged floats—simply cut rivets, insert new float, and your fan is as good as new, while a broken float in a cast-in fan means waiting for an entire new wheel. Figure out what that means to you, then write for Bayley "B" Bulletin.

Bayley Engineers

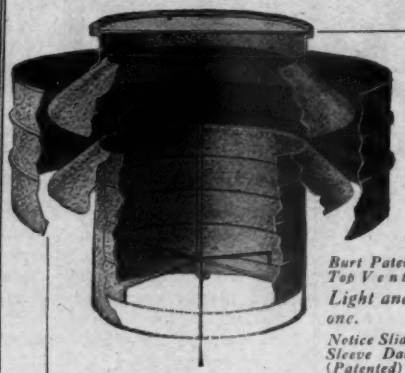
are ready to give you their services in solving your exhaust problems, without placing you under any obligation.



Bayley Mfg. Co.

Department I

Milwaukee, Wis.



Burt Patented Glass Top Ventilator—Light and Air in one.

Notice Sliding Sleeve Damper (Patented)

Is Your Mill Well Ventilated?

The health of your employees depends largely upon proper light and ventilation. Is your mill stuffy, ill-ventilated and dark?

The Burt Glass Top Ventilator is the last word in efficient ventilation. When properly placed and installed it cannot fail to make your mill an example of what good ventilation will do.

Don't let your mill go longer inefficiently ventilated. Write us today. Ask for the BURT book.

BURT MFG. CO., 244 HIGH ST., AKRON, OHIO

BURT VENTILATORS

CONCRETE — DIXIE PORTLAND CEMENT CO. ROYAL CHATTANOOGA, TENN. — PERMANENT

MR. TAXPAYER—YOU!

Do you want your country to spend YOUR good money on roads that will wear out before your bonded indebtedness is liquidated?

I SAY YOU DON'T.

What you want is a hard-surfaced road, with little cost for maintenance—a road that can be traveled in rain or snow, summer and winter. You want a PERMANENT road—that means CONCRETE!

Write for Literature—It's Free

DIXIE PORTLAND CEMENT CO.

CHATTANOOGA, TENN.

? ?

Have You Difficult Places to Oil??

Do You Want Just a Drop of Oil or More?

WELL

We can take care of your wants with the

LIDSEEN

POSITIVE FORCE FEED OILERS

Take it up with Your Jobber or with us

37 numbers of oilers to choose from ALL WELDED

LIDSEEN PRODUCTS

832-840 SO. CENTRAL AV. CHICAGO

BETTER NON-FLUID OIL LUBRICATION

Oil Stains Now an Unnecessary Expense

Mill Men no longer have to worry about the staining of good cotton by wasting, dripping or spattering liquid oil.

Instead they use

NON-FLUID OIL

Modern Textile Lubricants

that stay in the bearing and off the goods.

The fact that NON-FLUID OIL does not waste from bearings means more to you than the freedom from oil stains—it means better, because more positive lubrication for every machine in your mill.

And a natural economy results—less—much less NON-FLUID OIL is required than liquid oil—and your month's lubricant bills are materially reduced.

Look into this worth-while economy—we'll be glad to send free testing sample and Bulletin on the Lubrication of Textile Machinery if you'll fill out and mail the coupon—better do it today before you forget it.

NEW YORK & NEW JERSEY LUBRICANT CO.
401 Broadway New York
Southern Agent, L. W. Thomason, Charlotte, N. C.
Ample Stocks at Our Branches:
Charlotte, N. C.; Greenville, S. C.;
Atlanta, Ga.; New Orleans, La.

AT LESS COST PER MONTH

Why Not Use the Best?

D-A Lubricant stays where others fail! No waste, no drippage, less oil used, and better service. D-A is far superior on—

WINDER CAMS—One oiling per month, less noise, no dry grooves.

LOOM CAMS—ONE OILING EACH 3 WEEKS.

CHAIN DRIVES—No gumming, no leakage, less used.

SLASHER BEARINGS—Never boils over, gums or leaves any residue.

BALL BEARING SHAFTS—NO DRIPPING, one oiling lasts many weeks.

D-A is guaranteed to give this service or is returnable.
Special gun for applying given with each order.

D-A Lubricant

D-A Lubricant Company, Inc.
Indianapolis Ind.
Atlanta Branch,
33 Luckie St.

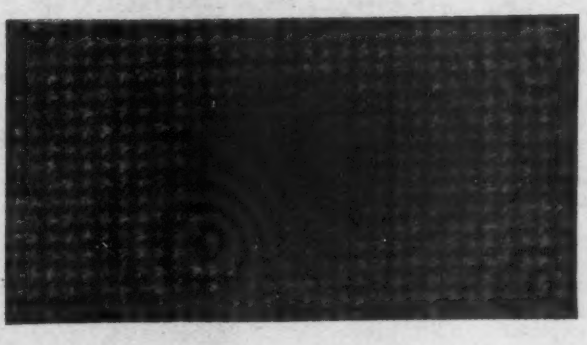
Stained Goods!

Hot Bearings mean short life.

Bearings are expensive.

Oil running out of bearings means dirty floors and machinery. RESULTS! WASTED MATERIAL FROM STAINED GOODS.

STAYSWELL laughs at drips and spatters.



STAINED GOODS ARE EASY TO AVOID BY USING THE SNOW-WHITE STAINLESS GRADES OF STAYSWELL

STAYSWELL "STAYS PUT" on the hottest bearing, eliminating all friction.

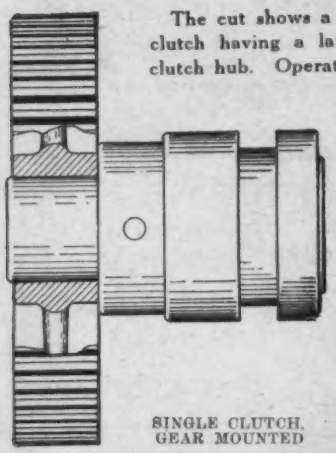
Let us quote you on your requirements.

LAMSON OIL CO., Inc.
10 Dorrance St. Wharf
PROVIDENCE, R. I.

THE JOHNSON FRICTION CLUTCH

IS USED IN CONJUNCTION WITH

LINK-BELT SILENT CHAIN SPROCKET



SINGLE CLUTCH, GEAR MOUNTED

Write for Catalog "G" and Stock List

The cut shows a SLIVER LAP MACHINE with clutch having a large sprocket mounted on the clutch hub. Operates as silent as the chain.

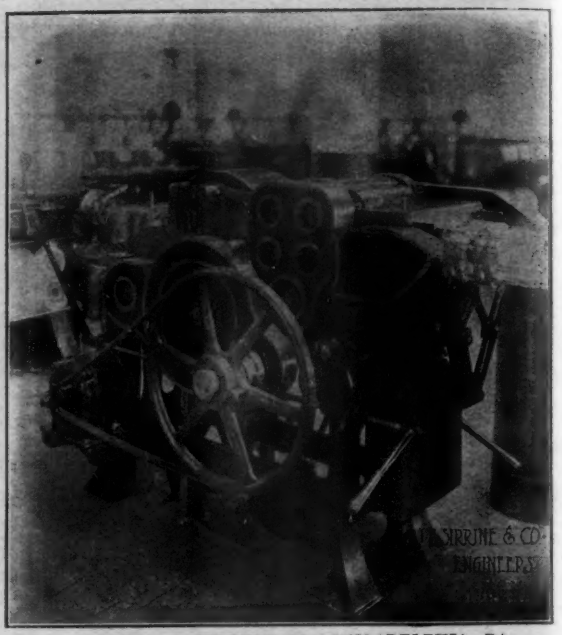
Pulley, gears or sprockets may be mounted on the Johnson Friction Clutch Hub.

This type of clutch is small and compact and very powerful for its size.

On account of its smooth operation in picking up the load the Johnson Friction Clutch is especially adapted to textile machinery.

Built in nine sizes both single and double.

Immediate shipment from stock of slow speed clutches.



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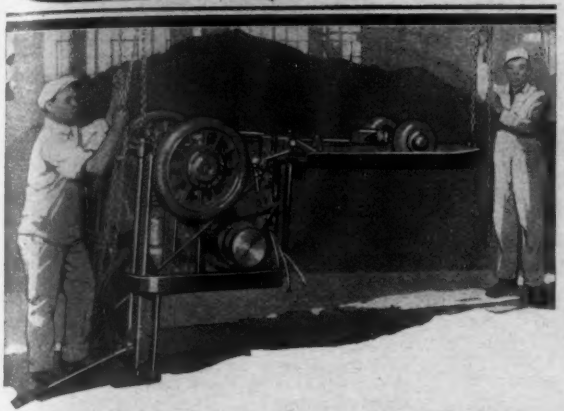
HIGH SPEED



A 15 Minute Job *for* 7 Men
A 3 Minute Job *for* 2 Cyclones!

IT'S a three minute job for one man to bring these two Cyclone Hoists into position, hook onto this 3200 lb. industrial truck, pick it up and invert it. It formerly required 7 men, 15 minutes to perform the same job by hand.

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We have capable distributors in all localities to aid you in laying out material-handling and hoisting systems and submit estimates. Catalog mailed on request.

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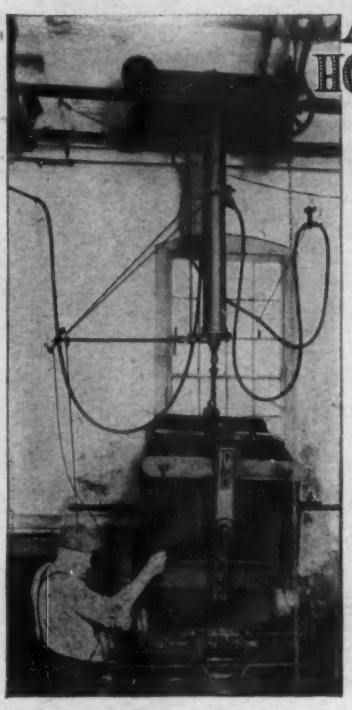

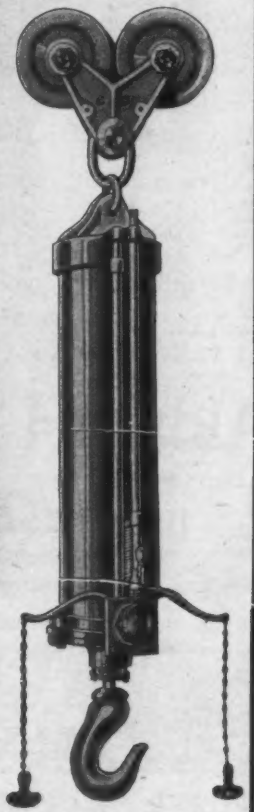

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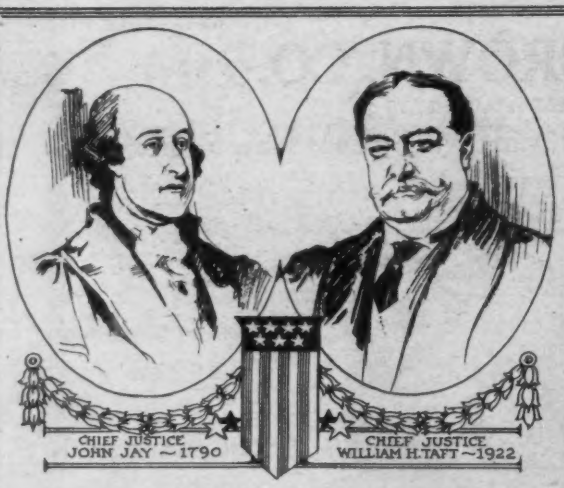

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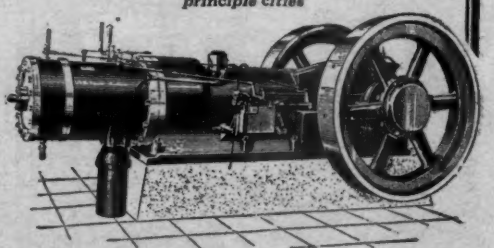

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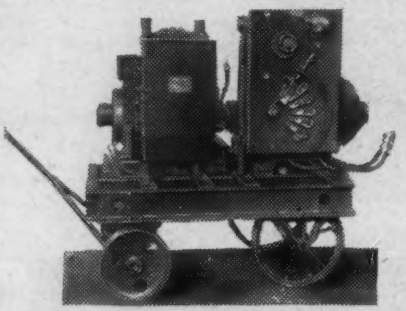

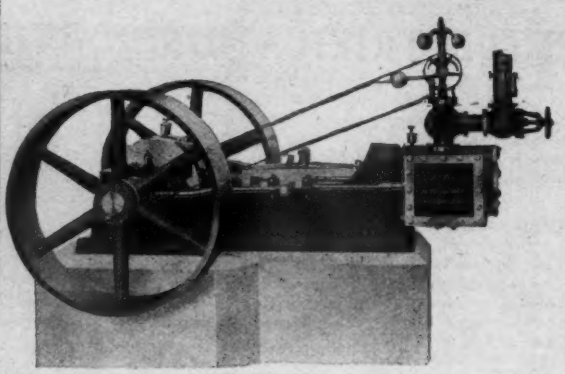

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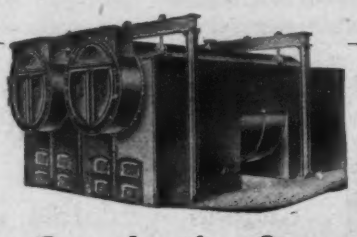

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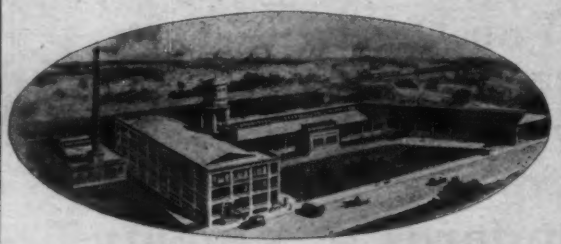

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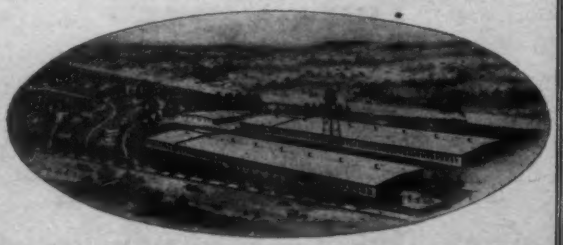

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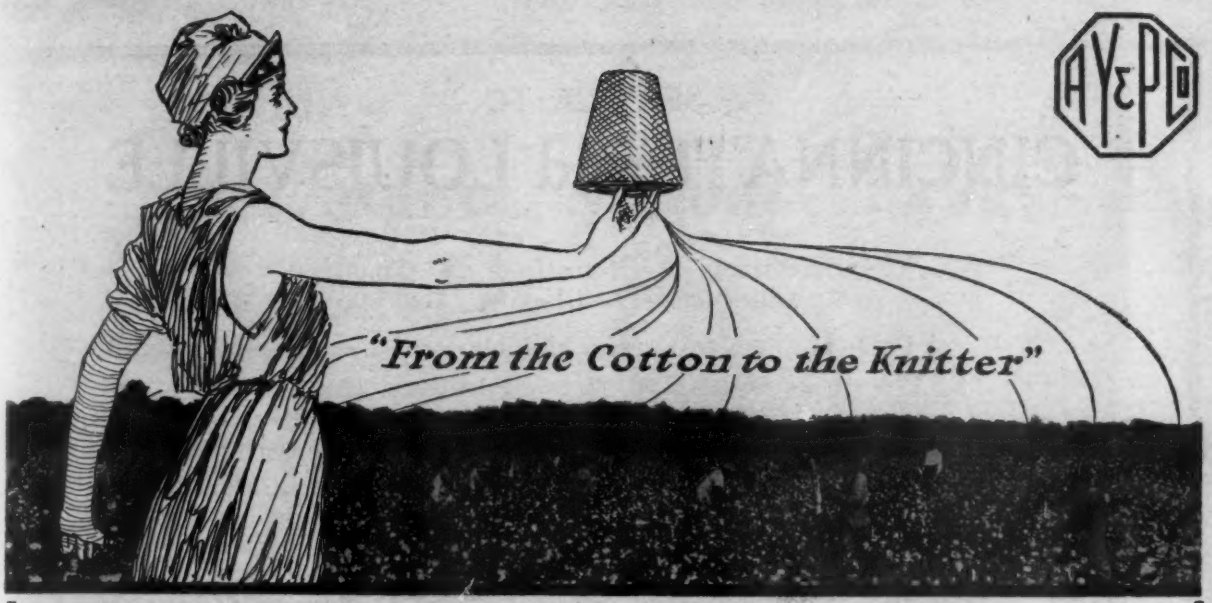

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The Citizens & Southern system has completely equipped offices in Atlanta, Savannah, Macon and Augusta.

Each of these offices is connected with the others by direct private wires.

If you are a customer of either office, and want information or service of any kind from the other cities these wires and the complete organization are at your service.

Hundreds of direct correspondents all over the South make it possible to give you practically the same service wherever you want it.

The Citizens & Southern Bank

Atlanta—Marietta at Broad

Savannah Macon Augusta

"No account too large, none too small"

CLASSIFIED ADVERTISING

RATES:

DISPLAYED.

"For Sale" and all other advertisements using bold-face type or otherwise displayed, $2.00 per inch per insertion.

Rates for larger spaces furnished on application.

WITHOUT DISPLAY.

"Positions Wanted" 3 cents per word per insertion. Minimum charge 50 cents. Payable in advance.

"Positions Open" and other undisplayed advertisements. 4 cents per word per insertion. Minimum charge $1.00. Payable in advance.

(When replies are to be received in our care, allow four words for box address.)

WANTED

An experienced Waste man to act as overseer for a room containing hard waste machines and a wool carding and spinning unit. Must be employed at present time and must present first-class recommendations.
Address Box 51,
Care COTTON, Atlanta, Ga.

POSITION WANTED—Married man, 25, with 6 years experience Third Hand and Fixer on combers and speeders, would like steady employment, full time. High and textile school experience. Not afraid of work. Working 30 hours at present. Address Box 57, care COTTON, Atlanta, Ga.

WANTED. POSITION AS ASSISTANT MANAGER or in Cost Department, by man with practical experience in mill and office. Look for permanent position with chance for promotion. Good references. Address box 59, care COTTON, Atlanta, Ga.

WANTED—One or two accounts of lines selling to Textile Mills by an organization with three salesmen covering Southern Mills. Commission basis. Address Box 58, care COTTON, Atlanta, Ga.

WANTED POSITION AS OVERSEER OF RING SPINNING. Understands all kinds of yarns; can give all particulars in first letter; at present employed.
Address Box B,
Care COTTON, Atlanta, Ga.

WANTED OVERSEER POSITION—American, 35, married. Eighteen years' practical and executive experience in spooling, warping, beaming, slashing, drawing-in and weaving on plain and herring bone weaves. Yarns 8s to 80s, single and ply. At present employed. Best of references. Box 50, care COTTON, Atlanta, Ga.

EXECUTIVE'S EMPLOYMENT AGENCY

WANTED: Superintendents, secretaries, bookkeepers, stenographers, overseers, who are out of employment, or either desire more suitable connections to communicate with us. In the last few days we have placed 27 practical men in better positions. Our services dignified and confidential.
Executives' Employment Agency,
Charlotte, N. C.

New and Second Hand

ENGINES
Corliss Automatic and Slide Valve

BOILERS
Pumps, Hoisting Engines, Gas and Gasoline Engines.

MACHINE TOOLS
Lathes, Planers, Shapers, Drill Presses, etc.

WOOD WORKING
Planers, Molders, Band Saws, etc.

ELEC. MACHINERY
Dynamos and Motors
AND SUPPLIES OF ALL KINDS

FRANK TOOMEY, Inc.,
127-31 N. Third St.
Philadelphia, - Pennsylvania

Do You Want to Sell it?

Probably you, like many other mills, have some equipment or machinery which you have taken out, or are thinking of taking out and replacing with new equipment.

Why not dispose of this second-hand equipment at a profit? COTTON is read by thousands of Cotton Mills that are hardly touched by Northern journals.

You Can Sell Your Second-Hand Equipment

to these mills through advertising in the Classified Advertising Section of COTTON. Such advertising produces results at small cost—why not try it out and get that second-hand equipment off your hands in a profitable way? Tell us what you have for sale and let us insert an advertisement for you.

COTTON
Grant Bldg., Atlanta, Ga.

MACHINERY BARGAINS

for Textile Mills

The Nashville Industrial Corporation, purchasers of the $87,000,000 Old Hickory Powder Plant, has released a large amount of machinery for immediate sale, a large portion of which is very desirable for use in textile plants. None of this equipment was in use over 90 days, and while in practically new condition it is offered at second-hand prices.

Special Bulletins covering various kinds of equipment will be sent on request.

A few of the many offerings:

PUMPS.

8—14-in. Worthington Class B, double suction, 8500 G.P.M. at 152 ft. head, at 1170 R.P.M., direct connected to 300 hp. G.E., 3 phase, 60 cycle, 2200 volt motors.

4—14-in. Allis-Chalmers, Type S, 7500 G.P.M. at 130 ft. heat at 1760 R.P.M., direct connected to 300 h.p. General Electric, 3 phase, 60 cycle, 2200 volt motors.

2—10-in. Allis-Chalmers, Type S, 3750 G.P.M. at 130-ft. head at 1765 R.P.M., direct connected to 150 h.p. Westinghouse 3 phase, 60 cycle, 2200 volt motors.

6—16-in. Allis-Chalmers, Type S, 8500 G.P.M. at 90-ft. head, direct connected to Type L, 300 h.p., 2000 R.P.M. G.E. Curtis steam turbine.

6—14-in. Allis-Chalmers, Type S, 6500 G.P.M. at 150-ft. head. 8100 G.P.M. at 90-ft. head, direct connected to 300 h.p. 2000 R.P.M. G.E. Curtis steam turbine.

1—20 x 12 x 16 Worthington duplex Underwriters fire pump, 1500 G.P.M., 100 lb. pressure.

200—New and used simplex and duplex, steam driven, Worthington pumps, 4½x3¾x4, 5½x4¾x5, 6x4x6, 7½x4½x10, 6x2½x6.

100—New and used belted 2½", 3", 5", 5", and 6" centrifugal pumps.

Bulletin No. 8 gives complete specifications of all Pumps.

BLOWERS.

2—18-in. Type C. American Electric Exhaust Fans.
10—18-in Buffalo Electric Disc Exhaust Fans.
6—24-in. Buffalo Electric Disc Exhaust Fans, Emerson Motors.
28—24-in. Buffalo Electric Disc Exhaust Fans, E. S. C. Motors.
64—30-in. Buffalo Electric Disc Exhaust Fans, Emerson Motors.
18—30-in. Buffalo Electric Exhaust Fans, Sprague Motors.
5—No. 1 Buffalo Baby Conoidal Fans, Emerson Motors.
4—No. 2 Buffalo Baby Conoidal Fans, Emerson Motors.
4—No. 3 Buffalo Baby Conoidal Fans, Emerson Motors.
15—No. 4 Buffalo Baby Conoidal Fans, Emerson Motors.
All the above equipped with standard A.C. Motors.

BLOWERS—continued.

5—No. 3 Buffalo Niagara Conoidal Fans.
10—No. 4½ Buffalo Niagara Conoidal Fans.
25—No. 6 Buffalo Niagara Conoidal Fans.
15—No. 7 Buffalo Niagara Conoidal Fans.
1—No. 9 Buffalo Niagara Conoidal Fan.
10—No. 4 Buffalo "B" Volume Blowers.
5—No. 5 Buffalo "B" Volume Blowers.
2—No. 6 Buffalo "B" Volume Blowers.
5—No. 8 Buffalo "B" Volume Blowers.
10—No. 1 Low Pressure Gas Exhausters.
10—30-in. Buffalo Standard Reversible Mill Exhausters.
25—50-in. Buffalo Standard Reversible Mill Exhausters.
10—No. 4 24-in. Buffalo Steel Pressure Blowers.
7—Roots Style D, High Pressure Type Blowers, capacity 890 cu. ft. per minute.
2—Connersville Blowers, capacity 3,200 cu. ft. per minute.
Write for Bulletin No. 11 giving complete specifications.

TRANSMISSION.

Thousands of pulleys, including pressed steel, split cast iron and solid cast iron, ranging in diameter from 6 to 56 inches, and in width from 2 to 32 inches, are included with the material at Old Hickory.

Also hundreds of tons of cold rolled shafting up to six inches in diameter, pillow blocks, drop hangers, ring-oiling, capillary and standard bearings, flange couplings, ribbed couplings, grim death couplings, wall brackets, floor stands, pillow block frames, friction clutches, cut-off couplings, sleeves, collars, etc.

We can supply complete line shafts or any transmission equipment needed. Write for Bulletin No. 15.

TANKS.

1500—New and used steel Tanks, small sizes. Mixing tanks, storage tanks, boiling tanks, pressure tanks, and open tanks.
2000—Wood tanks. All sizes.
Hydro-Extractors, Cotton Washers and Dryers, Mixing Pickers, Rinsers, etc.
Electrical Supplies of all kinds.

Write for Catalogues.

NASHVILLE INDUSTRIAL CORPORATION

JACKSONVILLE, TENN.

Buyers' Index

ACETYLENE GAS.
Commercial Acetylene Supply Co.
Oxweld Acetylene Co.
Standard Gas Products Co.

ACETYLENE WELDING APPARATUS.
(See Welding Apparatus.)

ACIDS.
(See Dyestuffs and Chemicals.)

ACCOUNTANTS.
American Audit Co.
Ernst & Ernst.

ACCOUNTING SYSTEMS.
Ernst & Ernst.

ADDING MACHINES.
Monroe Calc. Mch. Co.

AIR WASHERS.
Bayley Mfg. Co.
Buckeye Blower Co.
Carrier Eng. Corp.
Grinnell Co.
Parks-Cramer Co.

AIR COMPRESSORS.
(See Compressors.)

AIR CONDITIONING SYSTEMS.
(See Humidifying Apparatus.)

ALBONE.
Boessler & Haarlacher Chemical Co.

ALKALIES.
(See Dyestuffs and Chemicals.)

ALUM.
(See Finishing and Sizing Materials.)

ANILINE COLORS.
(See Dyestuffs and Chemicals.)

ANTI-CHLORINE.
(See Dyestuffs and Chemicals.)

ANTI-CHLORINE ACID GENERATOR.
Macomb Machine Co.

APRONS—RUB.
Bond Co., Chas.
Smith & Furbush Machine Co.

ARCHITECTS AND ENGINEERS.
Robert & Co.
Sirrine, J. E.
Stuhrman, Edw. A.
Thomason & Binger, Inc.

ASBESTOS MACHINERY.
Davis & Furber Mch. Co.

ASH HANDLING MACHINERY.
(See Coal Handling Machinery.)

ASPHALT SLATE SHINGLES.
(See Slate Asphalt Roofing.)

ASPIRATORS.
Beiger Co.

AUDITORS AND ACCOUNTANTS.
American Audit Co.
Ernst & Ernst.

AUTO TRUCKS.
(See Trucks—Auto.)

AUTOMATIC CONTROLLERS (TEMPERATURE).
(See Temperature Controllers.)

AUTOMATIC LOOM ATTACHMENTS.
(See Loom Attachments.)

AUTOMATIC FEEDS FOR COTTON.
Brooks & Doxey, Ltd.
Lord Bros.
Philadelphia Drying Mchry. Co.
Proctor & Schwartz, Inc.
Saco Lowell Shops.
Sargent's Sons Corp., C. G.
Smith & Furbush Mch. Co.
Whitin Mch. Works.

AUTOMATIC GUIDER (ELECTRIC).
Blake Electric Mfg. Co.

AUTOMATIC SCALES.
(See Scales.)

AUTOMOBILES.
Packard Motor Car Co.
White Co.

BACKWASHERS.
Sargent's Sons Corp., C. G.

BAROMETERS.
Taylor Instrument Co.

BALL BEARINGS.
Aldrich Mch. Works
Fafnir Bearing Co.
Hyatt Roller Bearing Co.
Skayef Ball Bearing Co.
U. S. Ball Bearing Co.

BALL BEARING HOUSINGS.
Aldrich Mch. Works
Fafnir Bearing Co.
U. S. Ball Bearing Co.

BALE BAND BUCKLES.
(See Box Strapping & Buckles.)

BALE OPENERS.
(See Openers.)

BALING MACHINES.
Brooks & Doxey, Ltd.
Draper Corporation.
Lord Bros.
Crompton & Knowles Loom Wks.
Economy Baler Co.
Rex Eng'g Corp.
Saco-Lowell Shops.

BALING PRESSES
(See Presses.)

BANDAGES, TAPES, ETC.
American Textile Banding Co.
Weimar Bros.

BANDAGE & TAPE MACHINES
Davis & Furber Mch. Co.
Foster Machine Co.

BANDS.
(See Tapes.)

BANKS.
Atlanta National Bank.
Citizens & Southern Bank.
National Shawmut Bank

BARRELS—FIBRE.
(See Fibre Products.)

BASKETS—MILL.
(See Boxes—Mill.

BATH CABINET—SHOWER.
Crane Co.
Sanymetal Products Co.

BATTERIES (ELEC.)
(See Storage Batteries.)

BEAMS.
Mossberg Pressed Steel Corp.
Walraven Co.

BEAM DYEING MACHINES.
Brandwood, John
Cocker Mchry. & Foundry Co.

BEAM HEADS.
Jordan Mfg. Co.
Mossberg Pressed Steel Corp.
Walraven Co.

BEAMING AND WARPING MACHINERY.
(See Warpers and Warping Machinery.)

BEARINGS.
Cresson-Morris Co.
Dodge Sales & Eng. Co.
Fafnir Bearing Co.
Hyatt Roller Bearing Co
Skayef Ball Bearing Co.
U. S. Ball Bearing Co.
Wood's Sons Co., T. B.

BELTING (LEATHER, CANVAS AND RUBBER).
American Supply Co.
Bond Co., Chas.
Fabreeka Belting Co.
Walraven Co.
Williams & Sons, I. B.

BELTING—CHAIN.
Link-Belt Company.
Morse Chain Co.

BELTING (ROUND—LEATHER).
Bond Co., Chas.

BELTING—ROPE.
(See Rope Transmission.)

BELT CONVEYORS.
Brown Co., A. & F.
Dodge Sales & Eng. Co.
Link-Belt Company.
Morse Chain Co.

BELT DRESSING.
Bond Co., Chas.
Dixon Crucible Co., Jos.
Walraven Co.
Williams & Sons, I. B.

BELT FASTENERS.
Flexible Steel Lacing Co.

BELT LACING.
Bond Co., Chas.
Fabreeka Belting Co.
Flexible Stele Lacing Co.
Walraven Co.
Williams & Sons, I. B.

BELT TIGHTENERS.
Brown Co., A. & F.
Link-Belt Company
Wood's Sons Co., T. B.

BENCH DRAWERS.
Lupton's Sons Co., David.

BENCH LEGS (PRESSED STEEL).
Lupton's Sons Co., David.

BENCHES (PARK AND PLAYGROUND).
(See Playground Equipment.)

BLEACHERIES.
(See Dyers, Bleachers and Finishers.)

BLEACHING KIERS.
Butterworth & Sons Co., H. W.
Hauser-Stander Tank Co.
Philadelphia Drying Mchry. Co.
Proctor & Schwartz, Inc.
Textile Finishing Machry. Co.

BLEACHING MACHINERY.
(See Dyeing, Bleaching and Finishing Machinery.)

BLEACHING, FINISHING AND SIZING MATERIALS.
(See Finishing Materials.)

BLOWERS AND BLOWER SYSTEMS
Bayley Mfg. Co.
Buckeye Blower Co.
Carlisle & Gale Co.
Carrier Eng. Corp.
Clements Mfg. Co.
General Electric Co.
Philadelphia Drying Mchry. Co.
Westinghouse Elec. & Mfg. Co.

BOARDS—FIBRE.
Diamond State Fibre Co.

BOARDS—FORM.
Pearson, Jos. T.

BOARD PANELS FOR WALLS AND CEILINGS.
Cornell Wood Products Co.

BOBBINS.
Draper Corporation.
Jordan Mfg. Co.
Lestershire Spool & Bobbin Co.
Shambow Shuttle Co.
Vermont Spool & Bobbin Co.
Walraven Co.
Whitin Machine Works.

BOBBIN HEADS.
Jordan Mfg. Co.
Vermont Spool & Bobbin Co.

BOILERS.
Cole Mfg. Co., R. D.
International Engineering Wks., Inc.
Lombard Iron Works & Supply Co.
Nashville Industrial Corp.
Schofield's Sons Co., J. S.
Toomey, Frank
Walsh & Weidner Boiler Co.

BOILER COMPOUNDS.
Dixon Crucible o., Jos.

BOILER FEED WATER PURIFICATION.
American Water Softener Co.
Norwood Engineering Co.
Scaife & Sons, Wm. B.

BOILER ROOM FITTINGS AND SUPPLIES.
Burt Mfg. Co.
Crane Co.
Dixon Crucible Co., Jos.
International Engineering Co.
Jenkins Bros.
Lunkenheimer Co.
Nashville Industrial Corp.
Oster Mfg. Co.

BOILER GRATES AND STOKERS.
(See Grates and Stokers.)

BOOKKEEPING MACHINES.
Monroe Calc. Mch. Co.

BOX STRAPPING AND TIE BUCKLES.
(See Banding Straps and Buck-

BOXES—MILL.
Hightower Box & Tank Co.
Keystone Fibre Co.
Lewis Co., G. B.
Lyon Metallic Mfg. Co.
Standard Fibre Co.
Walke Box Co.

BOXES—PACKING.
(See Packing Boxes.)

BRAID.
(See Tapes.)

BRAZING.
(See Welding.)

BRICK (PAVING AND FLOOR).
National Paving Brick Co.

BROKERS—COTTON.
(See Cotton Dealers & Brokers.)

BROKERS—STOCK.
(See Stocks and Bonds.)

BROOMS.
(See Brushes.)

BRUSHES—MILL.
Atlanta Brush Co.
Southwestern Broom Mfg. Co.

BRUSHES—MOTOR AND GENERATOR (COMMUTATOR).
Dixon Crucible Co., Jos.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

BUCKETS AND PAILS—MILL.
Standard Fibre Co.

BUCKETS—ELEVATOR AND GRAB.
Link-Belt Company

BUCKLES—COTTON TIE.
(See Box Strapping and Ties.)

BUILDING CONTRACTORS.
(See Contractors.)

BUILDINGS (ALL STEEL).
Truscon Steel Co.

BUILDING MATERIAL.
Anchor Post Iron Works.
Barrett Co., The
Birmingham Slag Co.
Cornell Wood Products Co.
Dixie Portland Cement Co.
Drouve Co., G.
Dufur & Co.
Hough Shade Corp.
Knapp Fence Co.
Lupton's Sons Co., David.
National Paving Brick Co.
Sanymetal Products Co.
Southern Cypress Mfg. Asso.
Southern Wood Preserving Co.
Truscon Steel Co.
Walker Electric & Plb. Co.

BURR PICKERS.
Davis & Furber Mch. Co.
Sargent's Sons, C. G.
Smith & Furbush Machine Co.

BUSHINGS.
Brown Co., A. & F.
Dodge Sales & Eng. Co.
Southern Spindle & Flyer Co.
Walraven Co.

BUSINESS METHODS.
Ernst & Ernst.

CABINETS.
(See Lockers.)

CALCULATING MACHINES.
Monroe Calculating Mch. Co.

CALENDERS.
Butterworth & Sons Co., H. W.
Textile Finishing Mchry. Co.

CALENDER ROLLS.
(See Rolls—Calender.)

CALLING SYSTEM—INTER-TELEPHONE.
Carter Electric Co

CAMLESS DETACHING DEVICES.
Beiger Co.

CANS—ROVING.
Keystone Fibre Co.
Standard Fibre Co.

CARS AND TRUCKS—FIBRE.
(See Trucks.)

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Grinnell Co.
Klauder-Weldon Dyeing Machine Co.
Macomb Machine Co.
Philadelphia Drying Mchry. Co.
Proctor & Schwartz, Inc.
Sargent's Sons & Co., C. G.
Textile Finishing Mchry. Co.
Tolhurst Mch. Works.

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Brooks & Doxey, Ltd.
Davis & Furber Mch. Co.
Howard & Bullough.
Lord Bros.
Saco-Lowell Shops.
Smith & Furbush Mach. Co.
Southern Spindle & Flyer Co.
Whitin Machine Works.

CARD CLOTHING.
Brooks & Doxey, Ltd.
Davis & Furber Mch. Co.
Howard & Bullough.
Lord Bros.
Saco-Lowell Shops.
Southern Spindle & Flyer Co.
Whitin Machine Works.

CARD FEEDS.
Brooks & Doxey, Ltd.
Davis & Furber Mch. Co.
Lord Bros.
Schofield Co., Wm.
Smith & Furbush Mach. Co.
Whitin Machine Co.

CARD GRINDING MACHINERY
Roy & Son Co., E. S.
Smith & Furbush Mach. Co.
Whitin Machine Works.

CARPET MACHINERY.
Butterworth, H. W. & Sons Co.
Crompton & Knowles Loom Works.
Philadelphia Drying Mchry. Co.
Proctor & Schwartz, Inc.
Schofield, Wm. Co.
Smith & Furbush Mach. Co.
Textile Finishing Mchry. Co.

CARRIER APRONS.
(See Aprons.)

CARRIER SYSTEM.
Curtis Pneumatic Machinery Co.

CASES—WOODEN.
(See Boxes.)

CASTINGS.
Briggs, Shaffner Co.
Cole Mfg. Co., R. D.
Cresson-Morris Co.
Lombard Fdry. & Mch. Co.
Walsh & Weidner Boiler Co.

CAUSTIC SODA.
(See Bleaching Materials.)

CEILINGS (WOOD PANEL).
Cornell Wood Products Co.

CEMENT.
Dixie Portland Cement Co.

CEMENT REINFORCEMENT.
Birmingham Slag Co.
Truscon Steel Co.

CEMENT AND BRICK COATING.
American Cement Paint Co.
Dixon Crucible Co., Jos.
Du Pont de Nemours & Co., E. I.
Wadsworth, Howland & Co., Inc.

CENTRAL STATION (ELECTRIC).
Alabama Power Co.
Georgia Railway & Power Co.

CENTRIFUGALS.
Cresson-Morris Co.
Fletcher Works.
Goulds Mfg. Co.
Schaum & Uhlinger.
Tolhurst Mch. Wks.

CHAIN DRIVES.
(See Belting—Chain Link.)

CHAIN—BLOCK, BICYCLE, AUTO, ENGINE, AGRICULTURAL, ETC.)
Morse Chain Co.

CHAIRS AND STOOLS.
Lyon Metallic Mfg. Co.
Manufacturing Equip. & Eng'g Co.
Royal Metal Mfg. Co.
Sanymetal Products Co.
Southern Theatre Equip. Co.

CHECK STRAPS.
Bond Co., Chas
Jacobs Mfg. Co., E. H.

CHEMICALS.
(See Dyestuffs and Chemicals.)

CHLORINE GAS.
Electro Bleaching Gas Co.

CLEANING MACHINE—BLOWER.
Clements Mfg. Co.

CLEARER CLOTH.
Philadelphia Felt Co.

CLOCKS—HANK, ETC.
(See Counters.)

CLOCKS (TIME).
Silberberg, Mortimer J.

CLOCKS—WATCHMAN.
Foxboro Co., Inc.

CLOSETS—WATER.
(See Toilets.)

CLOTH—ROLLER, CLEARER, SLASHER.
Philadelphia Felt Co.

CLOTH CUTTERS.
Firsching, J. A.
Wildman Mfg. Co.

CLOTH GUIDER (ELECTRIC).
Blake Electric Mfg. Co.

CLOTH REELS.
Gallaudet Aircraft Corp.

CLOTH ROOM MACHINERY.
Brooks & Doxey, Ltd.
Davis & Furber Mch. Co.
Butterworth, H. W., & Sons Co
Firsching, J. A.
Grinnell Co.
Lord Bros.
Saco-Lowell Shops.
Textile Finishing Mchry. Co.
Textile Service & Equip. Co.
Williams Co., J. H.
Wildman Mfg. Co.

CLOTH SHRINKING MACHINERY.
Philadelphia Drying Mchry. Co.
Proctor & Schwartz, Inc.
Reliance Machine Works.
Tolhurst Mch. Wks.

CLOTH WINDERS.
(See Winders.)

CLUTCHES—FRICTION.
Allis-Chalmers Mfg. Co.
Brown Co., A. & F.
Carlyle-Johnson Machine Co.
Cresson-Morris Co.
Dodge Sales & Eng. Co.
Link-Belt Company.
Mason, Volney W.
Wood's Sons Co., T. B.

CLUTCH LININGS.
Brown Co., A. & F.

COAL AND ASH HANDLING MACHINERY.
Link-Belt Company.

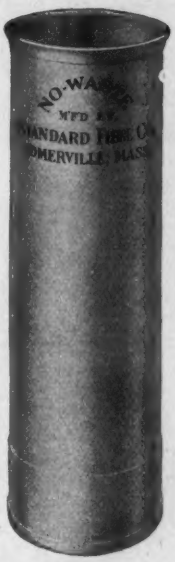
COAL TAR DISINFECTANTS.
(See Disinfectants.)

COCKS.
(See Valves.)

COLOR PAILS.
(See Buckets—Mill.)

WRITE US
for catalog on
other
Mill Receptacles.

No-Waste
SEAMLESS ROVING CANS



Waste Baskets
Taper Baskets
Oval Cans
Elliptical Cans

Sizes
9″-10″-11″-12″-14″-18″
diameters
and
up to 45″ high

NO
seams, joints,
or
Rivets.

Styles

Polished
Steel
or
Rolled Fibre
Top Rims
Rings
BEADED
securely
to
Hard Fibre
Shells.

Hard Fibre
MILL BARRELS
Plain Fibre
and
NEW PATTERN
Steel Clad
Trucks and Boxes
Combination
Doffing Cars

STANDARD FIBRE CO.
Somerville, Massachusetts

A Matter of Economy

The MARTINIQUE
IS GLAD TO ANNOUNCE
REDUCED RATES

SOMEONE must take the initiative in making it possible for people to travel and spend less money—now that there is less money to spend.
So, hand in hand with Hotel McAlpin which recently announced its reductions, the Martinique—just across the street and under the same management—becomes a leader in lowering hotel tariff.
This is setting an advance style, as it were, for there has not been an appreciable reduction in the cost of running a large New York hotel.
If, however, the public esteems the spirit in which it is done, as much as the management of the McAlpin and Martinique appreciates its patronage, then indeed, is it worth doing.

At the Martinique the new prices are: $3.50 up for rooms and bath; $2.50 for room without bath.

The
MARTINIQUE
Broadway, at 32nd St., New York
Frank E. Jago, Resident Manager

ATLANTA'S NEW MILLION DOLLAR HOTEL
POPULAR PRICED
HOTEL CECIL
COFFEE SHOP—ROOF GARDEN

312 ROOMS—FIRE PROOF—312 BATHS
RATES PER DAY, EUROPEAN PLAN

	ONE PERSON	TWO PERSONS
22 ROOMS AND BATH	$1.50	
104 ROOMS AND BATH	2.00	$3.00
104 ROOMS AND BATH	2.50	4.00
53 ROOMS AND BATH	3.00	5.00
14 ROOMS AND BATH	4.00	6.00
8 ROOMS AND BATH TWIN BEDS		5.00
7 ROOMS AND BATH TWIN BEDS		7.00

H. R. and C. R. CANNON, Proprietors
J. F. deJARNETTE, Manager
OPERATING
GEORGIAN HOTEL, ATHENS, GA. TERMINAL HOTEL, ATLANTA, GA.

BUYERS' INDEX—Continued.

COMB APRONS.
(See Aprons.)
COMBERS AND COMBER SUPPLIES.
Beiger Co.
Whitin Machine Wks.
COMMISSION MERCHANTS & DEALERS.
(See Cotton Cloth Commission Merchants.)
COMPRESSORS—AIR, GAS, ETC.
Allis-Chalmers Mfg. Co.
General Electric Co.
Goulds Mfg. Co.
Walraven Co., The.
COMMUTATOR BRUSHES.
(See Brushes—Motor and Generator.)
CONCRETE REINFORCEMENT.
Birmingham Slag Co.
CONDENSERS.
Allis-Chalmers Mfg. Co.
CONDUITS.
(See Elec. Machinery & Supplies.)
CONNECTORS—FRANKEL SOLDERLESS.
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Foundation Co.
Sirrine & Co., J. E.
Stuhrman, Edw. A.
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Truscon Steel Co.
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Walker Electric & Plb. Co.
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Foxboro Co., Inc.
General Electric Co.
Powers Regulator Co.
Taylor Instrument Co.
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CONVEYING MACHINERY.
American Supply Co.
Chisholm-Moore Mfg. Co.
Collins, J. D.
Cresson-Morris Co.
Curtis Pneumatic Mchry. Co.
Link-Belt Co.
Mason, Volney W.
Morse Chain Co.
Phila. Drying Machinery Co.
Proctor & Schwartz, Inc.
Schofield, Wm. Co.
Walraven Co.
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COOLING TOWERS.
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Davis & Furber Mch. Co.
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Smith & Furbush Mach. Co.
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Boger & Crawford
Carver-Beever Yarn Co., Inc.
Fawcett, Hughes.
Florsheim, H. A.
Hunter Mfg. & Comm. Co.
Lane & Co., J. H.
Weimar Bros.
Woodward, Baldwin & Co.
COTTON MERCHANTS AND BROKERS.
Beer, H. & B.
COTTON MILL MACHINERY AND SUPPLIES.
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Auto Creel Corp.
Barber-Colman Co.
Beiger Co.
Blake Electric Mfg. Co.
Brooks & Doxey, Ltd.
Butterworth & Sons, H. W.
Crompton & Knowles Loom Works.
Davis & Furber Mch. Co.
Draper Corporation.
Durant Mfg. Co.
Eclipse Textile Devices, Inc.
Firsching Co., J. A.
Fletcher Works.
Foxboro Co., Inc.
Gallaudet Aircraft Corp.
Greist Mfg. Co.
Grinnell Co.
Howard & Bullough.
Hunt Machine Co., Rodney.
Jacobs Mfg. Co., E. H.
Keystone Fibre Co.
Lestershire Spool & Mfg. Co.
Lord Bros.
Mates-Brown Co., Inc., B. P.
Mossberg Pressed Steel Corp.
Phila. Drying Mchry. Co.
Philadelphia Felt Co.
Proctor & Schwartz, Inc.
Sargent's Sons Corp., C. G.
Saco-Lowell Shops.
Schaum & Uhlinger.
Schofield Co., Wm.
Shambow Shuttle Co.
Smith & Furbush Mach. Co.
Southern Bending Co.
Stafford Co.
Steel Heddle Mfg. Co.
Suter, Alfred.
Terrell Machine Co.
Textile Finishing Machinery Co.
Textile Specialty Co.
Tolhurst Mch. Wks.
Universal Winding Co.
Vermont Spool & Bobbin Co.
Walraven Co.
Washburn & Sons, L. B.
Williams Co., J. H.
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Whitinsville Spinning Ring Co.
COTTON TAPE LOOM.
Davis & Furber Mch. Co.
Fletcher Works.
Schaum & Uhlinger.
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Foxboro Co.
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Rond Co., Chas.
Davis & Furber Mch. Co.
Philadelphia Felt Co.
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Suter, Alfred.
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Dixie Culvert & Metal Co.
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Southern Cypress Mfg. Asso.
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Sanitas Co.
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Crompton & Knowles Loom Wks.
Whitin Machine Works.
DOBBY CARDS.
Jacobs Mfg. Co., E. H.
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Lord Bros.
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Dixie Culvert & Metal Co.
DRAWING FRAMES.
Brooks & Doxey, Ltd.
Davis & Furber Mch. Co.
Howard & Bullough.
Lord Bros.
Saco-Lowell Shops.
Whitin Machine Works.
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Mossberg Pressed Steel Corp.
Steel Heddle Mfg. Co.
Williams Co., J. H.
DRYING APPARATUS.
Bayley Mfg. Co.
Buckeye Blower Co.
Grinnell Co.
Philadelphia Drying Mchry. Co.
Proctor & Schwartz, Inc.
DRYING FORMS—HOSIERY.
Pearson, Jos. T.
DRYING MACHINERY.
American Laundry Mchry. Co.
Butterworth, H. W., & Sons Co.
Grinnell Co.
Philadelphia Drying Mchry. Co.
Proctor & Schwartz, Inc.
Sargent's Sons Corp., C. G.
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Schofield Co., Wm.
Smith & Furbush Mach. Co.
DYERS, BLEACHERS AND FINISHERS.
American Yarn & Processing Co.
Boger & Crawford.
Dixie Mercerizing Co.
Franklin Process Co.
DYEING, BLEACHING, FINISHING AND PRINTING MACHINERY AND EQUIPMENT.
American Laundry Mchry. Co.
Brandwood, John.
Butterworth & Sons Co., H. W.
Cole Mfg. Co., R. D.
Electro Bleaching Gas Co.
Firsching, J. A.
Fletcher Works.
Franklin Process Co.
Grinnell Co.
Hauser-Stander Tank Co.
Hunt Machine Co., Rodney.
Klauder-Weldon Dyeing Mch. Co.
Macomb Machine Co.
Phila. Drying Machinery Co.
Proctor & Schwartz, Inc.
Reliance Machine Works.
Schaum & Uhlinger.
Textile Finishing Machinery Co., The.
Tolhurst Machine Works.
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Brandwood, John.
Franklin Process Co.
DYE STICKS.
Phila. Drying Machinery Co.
DYESTUFFS AND CHEMICALS.
Arnold, Hoffman & Co.
Barrett Co.
Borne, Scrymser Co.
Bosson & Lane.
Ciba Co., Inc.
Du Pont de Nemours & Co., E. I.
Electro Bleaching Gas Co.
Ford Co., J. B.
Grasselli Chemical Co.
India Alkali Works.
Kali Mfg. Co.
Lennig & Co., Chas.
Mates-Brown Co., Inc., B. P.
Metz & Co., H. A.
National Aniline & Chemical Co.
Rohm & Haas.
Newport Chemical Works, Inc.
Roessler & Hasslacher Chemical Co.
Sandoz Chemical Co.
Sonneborn Sons, Inc., L.
Staley Mfg. Co., A. E.
Surpass Chemical Co.
United Chemical Products Corp.
Wolf & Co., Jacques.
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Flexible Steel Lacing Co.
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Huntington & Guerry, Inc.
Ivanhoe Regent Works.
Walker Electric & Plbg. Co.
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Bayley Mfg. Co.
Blake Electric Mfg. Co.
Carter Electric Co.
Cooper Hewitt Electric Co.
Curtis, Paul W.
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Federal Electric Co.
General Electric Co.
Ivanhoe-Regent Works.
Mason, Volney W.
Walraven Co., The.
Walker Electric & Plbg. Co.
Walsh & Weidner Boiler Co.
Westinghouse Elec. & Mfg. Co.
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Rex Eng'g Corp.
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Allis-Chalmers Mfg. Co.
Power Mfg. Co.
Walraven Co., The.
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Cole Mfg. Co., R. D.
Lombard Iron Works & Supply Co.
Nashville Industrial Corp.
Schofield's Sons Co., J. S.
Toomey, Frank.
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Crane Co.
Jenkins Bros.
Lunkenheimer Co.
Oster Mfg. Co.
Power Mfg. Co.
Walraven Co.
Westinghouse Elec. & Mfg. Co.
EXHAUST HEADS.
Burt Mfg. Co.
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American Laundry Mchry. Co.
Fletcher Works.
Schaum & Uhlinger.
Tolhurst Machine Works.
FACTORY DESKS.
Lupton's Sons Co., David.
Manufacturing Equip. & Eng'g Co.
FACTORY & INDUSTRIAL SITES.
Alabama Power Co.
Georgia Ry. & Power Co.
Texas & Pacific Ry.
Nashville Industrial Corp.
FACTORY MANAGEMENT SYSTEMS.
Ernst & Ernst.
FANS—ELECTRIC.
Bayley Mfg. Co.
Buckeye Blower Co.
Carter Electric Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.
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Philadelphia Felt Co.
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Smith & Furbush Mch. Co.
FENCE—STEEL AND IRON.
Anchor Post Iron Works.
Knapp Fence Co.
FENCE POSTS—CREOSOTED PINE.
Southern Wood Preserving Co.
FIBRE PRODUCTS.
Keystone Fibre Co.
Standard Fibre Co.
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Bowser & Co., S. F.
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Federated Films of Atlanta.
Savini Films, Inc., R. M.
Southern States Film Co.
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Norwood Engineering Co.
Scaife & Sons Co., Wm. B.
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Norwood Engineering Co.
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Lennig & Co., Chas.
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FINISHING, BLEACHING AND SIZING MATERIALS.
Arnold, Hoffman & Co.
Barrett Co.
Borne, Scrymser Co.
Bosson & Lane.
Ciba Co., Inc.
Corn Products Refining Co.
Du Pont de Nemours & Co., E. I.
Electro Bleaching Gas Co.
Electric Smelting & Aluminum Co.
Ford Co., J. B.
India Alkali Works.
Kali Mfg. Co.
Keever Starch Co.
Lennig & Co., Chas.
Mates-Brown Co., Inc., B. P.
Metz & Co., H. A.
Moore Oil Refining Co.
National Aniline & Chemical Co.
Newport Chemical Works.
Roessler & Hasslacher Co.
Rohm & Haas Co.
Sandoz Chemical Co.
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United Chemical Products Corp.
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FIRE DOORS AND HARDWARE.
Lupton Sons Co., David.
Sanymetal Products Co.
Truscon Steel Co.
FIRE EXTINGUISHERS.
Grinnell Co.
FIRE HOSE.
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Allis-Chalmers Mfg. Co.
Cresson-Morris Co.
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Cooper Hewitt Electric Co.
General Electric Co.
FLOORING LUMBER.
Hightower Box & Tank Co.
Southern Cypress Mfg. Asso.
Southern Wood Preserving Co.
FLOORING (TILE & BRICK).
National Paving Brick Co.
FLOORING—WOOD BLOCKS.
Southern Wood Preserving Co.
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American Scrubbing Equipment Co.
FLOOR SCRUBBING POWDERS.
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Southern Spindle & Flyer Co.
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Southern Spindle & Flyer Co.
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Cresson-Morris Co.
Lombard Fdy. & Mch. Works
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Rundle-Spence Mfg. Co.
Southern Ice Machine Co.
Taylor, Halsey W.
FRICTION CLUTCHES.
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Federal Electric Co.
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Roy & Son Co., B. S.
Smith & Furbush Mch. Co.
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Lunkenheimer Co.
GEARS—SILENT.
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GRAPHITE.
Dixon Crucible Co., Jos.

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Lombard Fdry. & Mch. Co.
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Sanymetal Products Co.

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American Supply Co.
Atlanta Harness & Reed Mfg. Co.
Crompton & Knowles Loom Works.
Emmens Loom Harness Co.
Greist Mfg. Co.
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Lestershire Spool & Mfg. Co.

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HEATING & PLUMBING CONTRACTORS.
Walker Electric & Plbg. Co.

HEDDLES.
Crompton & Knowles Loom Works.
Draper Corporation.
Steel Heddle Mfg. Co.
Williams Co., J. H.

HEDDLE FRAMES.
Crompton & Knowles Loom Works.
Steel Heddle Mfg. Co.
Williams Co., J. H.

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Curtis Pneumatic Mchry. Co.
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Mason, Volney W.
Morse Chain Co.
Walraven Co.

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Cole Mfg. Co., R. D.
Franklin Process Co.
Philadelphia Drying Mchry. Co.

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Hotel Claridge.
Hotel Martinique.
Hotel Stetson.
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American Moistening Co.
Bayley Mfg. Co.
Carrier Eng. Corp.
Grinnell Co.
Parks-Cramer Co.

HUMIDITY INDICATING INSTRUMENTS.
Foxboro Co.
Powers Regulator Co.
Taylor Inst. Co.

HYDROMETERS.
Taylor Instrument Co.

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ICE MACHINES.
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ILLUMINATING ENGINEERS.
Curtis, Paul W.
Huntington & Guerry.
Ivanhoe-Regent Works.

INDICATING AND RECORDING INSTRUMENTS AND THERMOMETERS.
Durant Mfg. Co.
Foxboro Co., Inc.
General Electric Co.
Powers Regulator Co.
Taylor Instrument Co.

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INDUSTRIAL SITES.
Alabama Power Co.
Georgia Ry. & Power Co.
Nashville Industrial Corp.
Texas & Pacific Ry.

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Lunkenheimer Co.

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Atlanta Stamp & Stencil Wks.
Bradley Mfg. Co., A. J.

IRON WORK—ORNAMENTAL.
Anchor Post Iron Works.
Chicago Bridge & Iron Wks.
Dufur & Co.
Knapp Fence Co.
Lombard Iron Works & Supply Co.
Royal Metal Mfg. Co.

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Davis & Furber Mch. Co.
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Chicago Bridge & Iron Wks.
Lombard Iron Works & Supply Co.

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Hemphill Mfg. Co.
Scott & Williams.
Trump Bros. Machine Co.
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Foxboro Co.
Taylor Instrument Co.

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Carter Electric Co.
Cooper Hewitt Electric Co.
Curtis, Paul W.
Cutter Works, George.
General Electric Co.
Ivanhoe-Regent Works of G. E. Co.
Walker Electric & Plbg. Co.
Walraven Co.
Westinghouse Elec. & Mfg. Co.

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LAMP REFLECTORS.
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Cooper Hewitt Electric Co.
Curtis, Paul W.
Cutter Works, George.
Ivanhoe-Regent Works of G. E. Co.
Walker Electric & Plbg. Co.
Westinghouse Elec. & Mfg. Co.

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LAPPERS.
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Davis & Furber Mch. Co.
Lord Bros.
Saco-Lowell Shops.
Smith & Furbush Mch. Co.
Whitin Machine Works.

LAUNDRY MACHINERY.
American Laundry Mchry. Co.
Fletcher Works.
Hunt Machine Co., Rodney.
Schaum & Uhlinger.
Tolhurst Machine Works.

LAVATORIES.
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Manufacturing Equip. & Eng'g Co.
Vogel Co., Jos. A.

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American Supply Co.
Bond Co., Chas.
Jacobs Mfg. Co., E. H.
Williams & Sons, I. B.

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Cooper Hewitt Electric Co.
General Electric Co.
Ivanhoe-Regent Works.
Westinghouse Elec. & Mfg. Co.

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LOADERS—WAGON AND TRUCK.
Link-Belt Company.

LOCKERS—METAL.
Collins, J. D.
Lupton Sons Co., David.
Lyon Metallic Mfg. Co.
Manufacturers Equip. & Eng. Co.
Royal Metal Mfg. Co.
Sanymetal Products Co.

LOGWOOD EXTRACT.
(See Dyestuffs and Chemicals.)

LOOMS.
Crompton & Knowles Loom Works.
Davis & Furber Mch. Co.
Draper Corporation.
Fletcher Works.
Saco-Lowell Shops.
Schaum & Uhlinger.
Stafford Co.
Textile Service & Equip. Co.

LOOM ATTACHMENTS—AUTOMATIC.
Draper Corporation.

LOOM HARNESS.
(See Harness.)

LOOP PICKERS.
Jacobs Mfg. Co., E. H.

LUBRICANTS.
D-A Lubricant Co.
Dixon Crucible Co., Jos.
Lamson Oil Co., Inc.
Masury-Young Co.
Moore Oil Refining Co.
N. Y. & N. J. Lubricant Co.
Texas Co.

LUBRICATORS.
Bowser & Co., S. F.
Lidseen.
Lunkenheimer Co.
N. Y. & N. J. Lubricant Co.

LUG STRAPS.
(See Straps—Lug.)

LUMBER.
Cornell Wood Products Co.
Southern Cypress Mfg. Asso.
Southern Wood Preserving Co.

LUNCH ROOM EQUIPMENT.
(See Restaurant.)

MACHINE TOOLS.
(See Tools.)

MACHINISTS.
Briggs-Shaffner Co.
Cole Mfg. Co., R. D.
Cresson-Morris Co.
Lombard Fdry. & Mch. Works.

MARKET SERVICE.
Textile Service & Equip. Co.

MARKING POTS, STENCILS, INKS, ETC.
Atlanta Stamp & Stencil Wks.
Bradley Mfg. Co., A. J.

MERCERIZED YARNS.
(See Yarn Manufacturers).

MERCERIZERS.
Aberfoyle Mfg. Co.
Amer. Yarn & Processing Co.
Boger & Crawford.
Dixie Mercerizing Co.

MERCERIZED YARN.
Aberfoyle Mfg. Co.
American Yarn & Pro. Co.
Boger & Crawford Co.
Dixie Mercerizing Co.
Hunter Mfg. & Comm. Co.

MERCERIZING MACHINERY.
Butterworth, H. W. & Sons Co.
Textile Finishing Machinery Co.

METAL CEILINGS, ETC.
Lupton's Sons Co., David.
Truscon Steel Co.

METALS—PERFORATED.
(See Screens and Sieves.)

METERS—FLOW, AIR, GAS, ELECTRIC, STEAM, ETC.
Allis-Chalmers Mfg. Co.
Carter Electric Co.
Foxboro Co., Inc.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

METERS—COUNTING.
(See Counters.)

MILL BASKETS AND BOXES.
(See Boxes—Mill.)

MILL ENGINEER.
(See Architects and Engineers.)

MILL VILLAGES.
(See Villages.)

MILL SUPPLIES—MISCELLANEOUS.
(See Supplies—Mill.)

MILL WHITE PAINT.
(See Paint.)

MOPS.
Atlanta Brush Co.
Southwestern Broom Mfg. Co.

MOTION PICTURES.
(See Films.)

MOTORS AND GENERATORS—ELECTRIC.
Allis-Chalmers Mfg. Co.
Carter Electric Co.
Curtis, Paul W.
General Electric Co.
Nashville Industrial Corp.
Walraven Co., The.
Walker Electric & Plbg. Co.
Westinghouse Elec. & Mfg. Co.

MOVING PICTURE MCH. AND SUPPLIES.
(See Theatre Equipment or Films).

MULES.
Davis & Furber Mch. Co.

NAPPERS.
Davis & Furber Mch. Co.
Roy & Son Co. H. S.

NAPPER CLOTHING.
Davis & Furber Mch. Co.

OFFICE EQUIPMENT & SUPPLIES.
Byrd Printing Co.
Dowman-Wilkins Ptg. Co.
Carter Electric Co.
Knapp Fence Co.
Lupton's Sons Co., David.
Monroe Calculating Mch. Co.
Royal Metal Mfg. Co.
Smith & Bros. Typewriter Co.
Sanymetal Products Co.

OFFICE PARTITIONS.
Knapp Fence Co.
Lupton's Sons Co., David.
Lyon Metallic Mfg. Co.
Sanymetal Products Co.

OIL—LUBRICATING.
D-A Lubricant Co.
Johnson & Co., Inc., Oliver.
Lamson Oil Co., Inc.
Masury-Young Co.
Moore Oil Refining Co.
Texas Co.
Wadsworth, Howland & Co., Inc.

OIL ENGINES.
(See Engine Oil.)

OIL FILTERS.
Burt Mfg. Co.

OILS—FINISHING.
(See Finishing and Sizing Materials.)

OIL CANS.
Lidseen.

OIL CUPS.
(See Lubricators.)

OIL PAPER.
Bradley Mfg. Co., A. J.

OIL STORAGE TANKS AND PUMPS.
Bowser & Co., S. F.

OILING DEVICES.
(See Lubricators.)

OPNERS FOR COTTON, WOOL, WASTE, ETC.
Brooks & Doxey, Ltd.
Davis & Furber Mch. Co.
Lord Bros.
Saco-Lowell Shops.
Schofield Co., Wm.
Smith & Furbush Mach. Co.
Whitin Machine Works.

OVERHEAD CARRIERS.
Chisholm-Moore Mfg. Co.
Curtis Pneumatic Mchry. Co.

OXIDIZING MACHINERY.
Phila. Drying Machinery Co.

OXYGEN.
Bird-Potts Co., Inc.
Commercial Acetylene Supply Co.
Oxweld Acetylene Co.
Standard Gas Products Co.

PACKING BOXES AND CASES—WOODEN.
Hauser-Stander Tank Co.
Hightower Box & Tank Co.
Lewis Co., G. B.
Walke Box Co., Inc.

PACKINGS.
Jenkins Bros.
Walraven Co.

PAINT.
American Cement Paint Co.
Barrett Co., The.
Dixon Crucible Co., Jos.
Du Pont de Nemours & Co., E. I.
Johnson & Co., Oliver.
Wadsworth, Howland & Co., Inc.

PAINTING CONTRACTORS.
(See Contractors.)

PANEL BOARDS.
(See Switchboards.)

PAPER.
Bradley Mfg. Co., A. J.

PARTITIONS—STEEL AND WIRE.
Knapp Fence Co.
Lupton's Sons Co., David.
Lyon Metallic Mfg. Co.
Sanymetal Products Co.

PERBORATE OF SODA.
Roessler & Hasslacher Chemical Co.

PERFORATED METAL.
(See Screens and Sieves.)

PEROXIDES.
Roessler & Hasslacher Chemical Co.

PICKERS—CURLED HAIR.
Davis & Furber Mch. Co.
Schofield Co., Wm.
Smith & Furbush Machine Co.

PICKERS—LEATHER.
Bond Co., Chas.
Garland Mfg. Co
Jacobs Mfg. Co., E. H.

PICKER LOOPS.
Jacobs Mfg. Co., E. H.

PICKER STICKS.
Davis & Furber Mch. Co.
Garland Mfg. Co.
Southern Bending Co.
Walraven Co.

PICKING MACHINERY.
Brooks & Doxey, Ltd.
Davis & Furber Mch. Co.
Howard & Bullough Am. Machine Co.
Lord Bros.
Saco-Lowell Shops.
Schofield Co., Wm.
Smith & Furbush Mach. Co.
Whitin Machine Works.

PINIONS.
General Electric Co.

PIPE (STEEL RIVETED).
Chicago Bridge & Iron Wks.

PIPE AND PIPE FITTINGS.
Chicago Bridge & Iron Wks.
Crane Co.
Grinnell Co.
Lunkenheimer Co.
Parks-Cramer Co.
Scaife & Sons Co., Wm. B.
Walker Electric & Plbg. Co.
Walraven Co.

PIPE DRAINAGE.
Dixie Culvert & Metal Co.

PIPE JOINT COMPOUND.
Dixon Crucible Co., Jos.

PIPE THREADING AND CUTTING MACHINES.
Oster Mfg. Co.
Walraven Co., The.

PIPING ENGINEERS.
Grinnell Co.
Walker Electric & Plbg. Co.

PIPE BENDING.
Grinnell Co.

PIPING (POWER & PROCESS).
Grinnell Co.

PLAYGROUND APPARATUS & EQUIPMENT.
Crane Co.
Manufacturing Equip. & Eng'g Co.
Royal Metal Mfg. Co.
Rundle-Spence Mfg. Co.
Taylor, Halsey W.

PLUMBING & HEATING CONTRACTORS.
Walker Electric & Plbg. Co.

PNEUMATIC MACHINERY & TOOLS.
Curtis Pneumatic Mchry. Co.

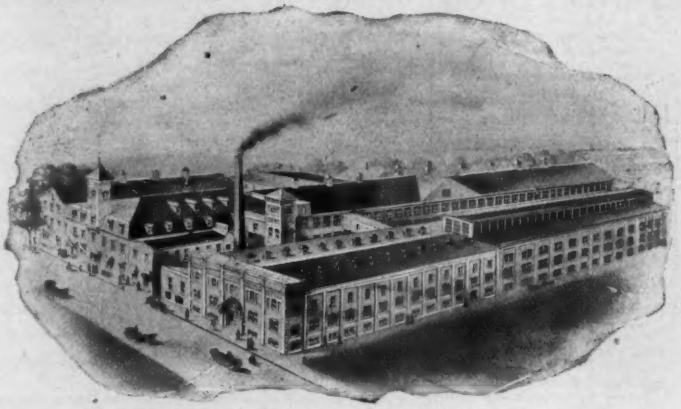
PORTABLE CONVEYORS.
(See Conveyor.)

POSTS—FENCE (WOOD).
Southern Wood Preserving Co.

POWER—ELECTRIC.
Alabama Power Co.
Georgia Ry. & Power Co.

POWER TRANSMISSION.
Aldrich Machine Works.
Allis-Chalmers Mfg. Co.
Bond Co., Chas.
Brown Co., A. & F.
Carlyle-Johnson Mch. Co.
Cresson-Morris Co.
Dixon Crucible Co., Jos.
Fabreeka Belting Co.
Fafnir Bearing Co.
Flexible Steel Lacing Co.
General Electric Co.
Grinnell Co.
Hyatt Roller Bearing Co.
Link-Belt Company.
Morse Chain Co.
Skayef Ball Bearing Co.
U. S. Ball Bearing Co.
Walraven Co., The.
Westinghouse Elec. & Mfg. Co.
Williams & Sons, I. B.
Wood's Sons Co., T. B.

PRESERVATIVE PAINT FOR METAL WORK.
(See Paints.)



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Butterworth & Sons Co., H. W.
Economy Baler Co.
Phila. Drying Mch. Co.
Proctor & Schwartz, Inc.
Reliance Machine Works.
Rex Eng'g Corp.
Smith & Furbush Mach. Co.
Textile Finishing Machinery Co., The.

PRESSURE REGULATORS.
(See Regulators—Pressure.)

PRINTING.
Byrd Printing Co.
Dowman Wilkins Printing Co.
Showalter Printing Co., A. J.

PULLEYS.
Brown Co.; A. & F.
Cole Mfg. Co., R. D.
Dodge Sales & Eng. Co.
Cresson-Morris Co.
Link-Belt Company.
Mason, Voiney W.
Walraven Co., The.
Wood's Sons Co., T. B.

PULLEY COVERING.
Williams & Sons, I. B.

PUMPS.
Allis-Chalmers Mfg. Co.
Bowser & Co., S. F.
Goulds Mfg. Co.
Sydnor Pump & Well Co., Inc.
Toomey, Frank.
Walraven Co.
Walsh & Weidner Boiler Co., The.
Westinghouse Elec. & Mfg. Co.

PUMPS—OIL.
Bowser & Co., S. F.
Lunkenheimer Co.

PUMP VALVES.
(See Valve Discs.)

PYROMETERS.
Foxboro Co.
Taylor Instrument Co.

QUILLS.
Jordan Mfg. Co.

QUILL CLEANING MACHINES.
Terrell Machine Co.

RAILWAYS.
A. B. & A. Ry.
A. & W. P. Ry.
Georgia Railroad.
Southern Railway System.
Texas & Pacific Ry.

RAW STOCK DRYING SYSTEMS.
Brandwood, John.

RECEPTACLES—FIBRE.
(See Fibre Products.)

RECORDING INSTRUMENTS.
Durant Mfg. Co.
Foxboro Co., Inc.
General Electric Co.
Powers Regulator Co.
Taylor Instrument Co.

REEDS.
American Supply Co.
Atlanta Harness & Reed Mfg. Co.
Emmons Loom Harness Co.
Walraven Co.

REELS.
Crompton & Knowes Loom Works.
Davis & Furber Mch. Co.
Draper Corporation.
Gallaudet Aircraft Corporation.
Hunt Machine Co., Rodney.
Mossberg Pressed Steel Co.
Saco-Lowell Shops.
Schofield Co., Wm.
Whitin Machine Works.

REFLECTORS—LAMP.
(See Lamp Reflectors.)

REGULATORS—LIQUID LEVEL.
Foxboro Co., Inc.
General Electric Co.
Powers Regulator Co.

REGULATORS—PRESSURE.
Foxboro Co., Inc.
General Electric Co.
Powers Regulator Co.
Taylor Instrument Co.

REGULATORS—TEMPERATURE.
(See Temperature Controllers.)

REINFORCING SLAG.
Birmingham Slag Co.

REPAIRING—ELECTRICAL.
Briggs-Shaffner Co.
Curtis, Paul W.
Westinghouse Elec. & Mfg. Co.

REPAIRING—TEXTILE MACHINERY, ETC.
Bird-Potts Co., Inc.
Briggs-Shaffner Co.
General Machine Works.
Southern Spindle & Flyer Co.
Standard Gas Products Co.

RESTAURANT EQUIPMENT.
Sanymetal Products Co.

RIBBERS.
(See Knitting Machinery.)

RIB TOP CUTTERS.
General Machine Works.
Wildman Mfg. Co.

RING TRAVELERS—STEEL AND BRONZE.
Whitinsville Spinning Ring Co.
Whitin Machine Works.

RINGS—SPINNING.
(See Spinning Rings.)

ROCKER SHAFT BEARINGS.
(See Bearings.)

ROLLS—CALENDER.
Brooks & Doxey, Ltd.
Butterworth & Sons Co., H. W.
Davis & Furber Mch. Co.
Lord Bros.
Roy & Son Co., B. S.
Textile Finishing Mchry. Co.
Washburn & Sons, L. R.

ROLLS—RUBBER COVERED.
Butterworth & Sons Co., H. W.
Textile Finishing Mchry. Co.
Washburn & Sons, L. R.

ROLLS—STEEL.
Brooks & Doxey, Ltd.
Butterworth & Sons Co., H. W.
Davis & Furber Mch. Co.
Lord Bros.
Southern Spindle & Flyer Co.
Textile Finishing Mchry Co.
Washburn & Sons, L. R.

ROLLS (WOODEN).
Washburn & Sons, L. R.

ROLLER CLOTH.
Philadelphia Felt Co.

ROLLER LEATHER.
Bond & Co., Chas.

ROLL WASTE PACKERS.
Belger Co.

ROOFING.
Barrett Co., The.
Cortright Metal Roofing Co.
Southern Wood Preserving Co.
Wadsworth, Howland & Co.
Walraven Co.

ROOF AND CEMENT COATING.
American Cement Paint Co.
Barrett Co.
Du Pont de Nemours & Co., E. I.
Johnson & Co., Inc., Oliver.
Wadsworth, Howland & Co

ROPE—TRANSMISSION.
Allis-Chalmers Mfg. Co.
Brown Co., A. & F.
Cresson-Morris Co.
Link-Belt Company.
Walraven Co.

ROPE SHEAVES.
Brown Co., A. & F.

ROVING CANS.
(See Cans—Roving.)

ROVING MACHINERY.
Brooks & Doxey, Ltd.
Davis & Furber Mch. Co.
Howard & Bullough.
Lord Bros.
Saco-Lowell Shops.
Whitin Machine Works.

RUBBER GOODS.
Estes Surgical Supply Co.

RUBBER STAMPS.
(See Stamps, Stencils, Etc.)

SALAMANDERS.
Drouve Co., G.

SALTS.
(See Finishing & Sizing Materials.)

SANITARY PRODUCTS.
Crane Co.
Dixie Culvert & Metal Co.
Manufacturing Equip. & Eng'g Co.
Rundle-Spence Mfg. Co.
Sanitas Co.
Sanymetal Products Co.
Taylor, Halsey W.
Vogel Co., Jos. A.
Walker Electric & Plbg. Co.

SASH-WINDOW—STEEL.
Drouve Co., G.
Lupton's Sons Co., David.
Sanymetal Products Co.
Truscon Steel Co.

SASH OPERATOR.
Drouve Co., G.

SCALE PREVENTER—BOILER.
(See Boiler Feed Water Purification.)

SCREENS—MOVING PICTURE.
Southern Theatre Equip. Co.

SCREENS AND SIEVES—PERFORATED.
Allis-Chalmers Mfg. Co.
Erdle Perforating Co.
Link-Belt Company.

SCOURING MACHINERY.
(See Washers—Cloth.)

SCRUBBING MACHINE—FLOOR.
American Scrubbing Mach. Co.

SCRUBBING AND WASHING POWDERS.
India Alkali Works.
Warren Soap Mfg. Co.

SCUTCHERS.
Brooks & Doxey, Ltd
Lord Bros.
Whitin Machine Works.

SECOND HAND MACHINERY AND SUPPLIES
Nashville Industrial Corp.
Textile Service & Equip. Co.
Toomey, Frank, Inc.
Walraven Co.

SELVAGE HARNESS.
(See Harness.)

SEWING MACHINES.
Merrow Machine Co., The.
Textile Finishing Mchry. Co.

SHADES—ELECTRIC LAMP.
(See Reflectors.)

SHADES (WINDOW).
Hough Shade Corp.

SHAFTING AND HANGERS.
Allis-Chalmers Mfg. Co.
Brown Co., A. & F.
Cresson-Morris Co.
Dodge Sales & Eng. Co.
Fafnir Bearing Co.
Grinnell Co.
Link-Belt Co.
Skayef Ball Bearing Co.
Walraven Co., The.
Wood's Sons Co., T. B.

SHEARS.
Roy & Sons Co., B. S.

SHELVING—SECTIONAL STEEL.
Collins, J. D.
Hyatt Roller Bearing Co.
Lupton's Sons Co., David.
Lyon Metallic Mfg. Co.
Manufacturing Equip. & Eng'g Co.
Royal Metal Mfg. Co.
Sanymetal Products Co.

SHINGLES—ASPHALT.
Barrett Co.

SHINGLES—METAL.
Cortright Metal Roofing Co.

SHINGLES—WOOD.
Southern Cypress Mfg. Asso.
Southern Wood Preserving Co.

SHIPPING ROOM MACHINERY AND SUPPLIES.
Atlanta Stamp & Stencil Wks.
Bradley Mfg. Co., A. J.
Collins, J. D.
Hauser-Stander Tank Co.
Hightower Box & Tank Co.
Royal Metal Mfg. Co.
Lewis Co., G. B.
Lyon Metallic Mfg. Co.
Standard Fibre Co.
Walraven Co., The.
Walke Box Co., Inc.

SHOWER BATHS AND CABINETS.
Crane Co.
Lyon Metallic Mfg. Co.
Sanymetal Products Co.

SHUTTLES.
Crompton & Knowles Loom Works.
Draper Corporation.
Jordan Mfg. Co.
Shambow Shuttle Co.
Southern Bending Co.
Walraven Co.
Williams Co., J. H.

SIGNS—ELECTRIC.
Federal Electric Co.

SINGEING MACHINERY.
Butterworth & Sons Co., H. W.
Phila. Drying Machine Co.
Textile Finishing Machinery Co., The.

SIREN.
Brown Co., A. & F.
Federal Electric Co.

SITES FOR FACTORIES.
(See Industrial Sites.)

SIZE BOX TEMPERATURE CONTROLLER.
Foxboro Co.
Powers Regulator Co.

SIZE KETTLES.
Butterworth & Sons Co., H. W.
Hauser-Stander Tank Co.
Howard & Bullough American Machine Co.
Lombard Iron Wks. & Sup. Co.
Saco-Lowell Shops.
Textile Finishing Machinery Co., The.

SIZING AND FINISHING COMPOUNDS.
(See Finishing and Sizing Materials.)

SKEWERS.
Jordan Mfg. Co.

SKYLIGHTS.
Drouve Co., G.
Lupton's Sons Co., David.

SKYLIGHT GUARDS.
Knapp Fence Co.

SLAG FOR CONCRETE.
Birmingham Slag Co.

SLASHERS AND SLASHER ROOM SUPPLIES.
Butterworth & Sons Co., H. W.
Cole Mfg. Co., R. D.
Davis & Furber Mch. Co.
Howard & Bullough.
Saco-Lowell Shops.
Textile Finishing Machinery Co., The.

SLASHER CLOTH.
Philadelphia Felt Co.

SLASHER HOODS.
Cole Mfg Co., R. D.

SLASHER TAPE.
(See Tape—Slasher.)

SLATE ASPHALT ROOFING.
Barrett Co.

SLIDING PARTITION HARDWARE.
Lupton's Sons Co., David.
Lyon Metallic Mfg. Co.
Manufacturing Equip. & Eng'g Co.
Sanymetal Products Co.

SLUBBERS.
Brooks & Doxey, Ltd.
Davis & Furber Mch. Co.
Howard & Bullough.
Lord Bros.
Saco-Lowell Shops.
Whitin Machine Works.

SMOKE STACKS.
Chicago Bridge & Iron Wks.

SOAP—TEXTILE.
Arnold, Hoffman & Co.
Borne, Scrymser Co.
Ciba Co., Inc.
Du Pont de Nemours & Co., E. I.
Electric Smelting & Aluminum Co.
India Alkali Wks.
Kali Mfg. Co.
Lennig & Co., Chas.
Mates-Brown Co., Inc., B. P.
Newport Chemical Works.
Rohm & Haas Co.
Sonneborn Sons, Inc., L.
United Chemical Products Corp.
Warren Soap Mfg. Co.
Wolf & Co., Jacques.

SODA—TEXTILE, SODA ASH AND BOILING.
Lennig & Co., Chas.
Sonneborn Sons, Inc., L.

SOFTENERS—COTTON.
Arnold, Hoffman & Co.
Borne, Scrymser Co.
Bosson & Lane.
Ciba Co., Inc.
Du Pont de Nemours & Co., E. I.
Ford Co., J. B.
Grasselli Chemical Co.
Kali Mfg. Co.
Lennig & Co., Chas.
Mates-Brown Co., Inc., B. P.
Moore Oil Refining Co.
Newport Chemical Works.
Roessler & Hasslacher Chemical Co.
Rohm & Haas Co.
Sonneborn Sons, Inc., L.
United Chemical Prod. Corp
Wolf & Co., Jacques.

SOFTENERS—WATER.
(See Water Softeners.)

SOLDERLESS CONNECTORS—FRANKEL.
Westinghouse Elec. & Mfg. Co.

SOLOZONE.
Roessler & Hasslacher Chem. Co.

SOLVENTS.
(See Finishing.)

SPEEDERS.
Jordan Mfg. Co.
Vermont Spool & Bobbin Co.

SPEEDOMETERS.
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SPINDLES.
Draper Corporation.
Saco-Lowell Shops.
Southern Spindle & Flyer Co.
Vermont Spool & Bobbin Co.
Whitin Machine Works.

SPINNERS.
Aberfoyle Mfg. Co.
Amer. Yarn & Processing Co
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Arlington Cotton Mills.
Arrow Mills, Inc.
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Flint Mfg. Co.
Fletcher Works.
Florsheim, H. A.
Gray Mfg. Co.
Hunter Mfg. & Comm. Co.
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Parkdale Mills, Inc.

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American Machine Co., H. & B.
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Davis & Furber Mch. Co.
Howard & Bullough.
Lord Bros.
Schaum & Uhlinger.
Saco-Lowell Shops.
Whitin Machine Works.

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Brooks & Doxey, Ltd.
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Howard & Bullough.
Greist Mfg. Co.
Lord Bros.
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Davis & Furber Mch. Co.
Draper Corporation.
Saco-Lowell Shops.
Smith & Furbush Mach. Co.
Whitin Machine Works.

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Textile Specialty Co.

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Jordan Mfg. Co.
Lestershire Spool & Mfg. Co
Mossberg Pressed Steel Corp'n.
Vermont Spool & Bobbin Co.
Walraven Co.

SPRINKLER SYSTEMS.
Grinnell Co.

SPRINKLER TANKS.
(See Tanks, Towers, Etc.)

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Link-Belt Company.
Morse Chain Co.

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Atlanta Stamp & Stencil Wks
Bradley Mfg. Co., A. J.

STAND PIPES.
(See Tanks.)

STARCH AND GUMS.
(See Finishing and Sizing Materials.)

STEAM ENGINES.
(See Engines—Steam.)

STEAM HOSE.
(See Hose—Fire.)

STEAM PUMPS.
(See Pumps—Steam.)

STEAM TRAPS.
(See Traps—Steam.)

STEEL PLATE CONSTRUCTION.
Chicago Bridge & Iron Wks.

STEEL RIVETED PIPE.
Chicago Bridge & Iron Wks.

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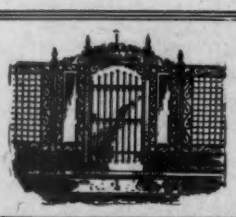

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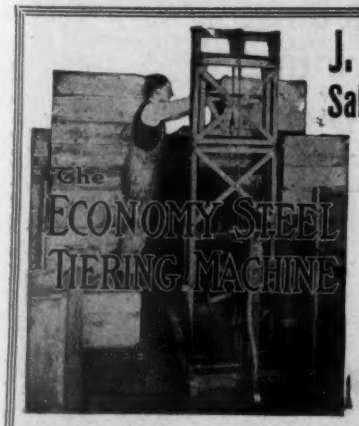

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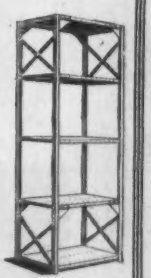

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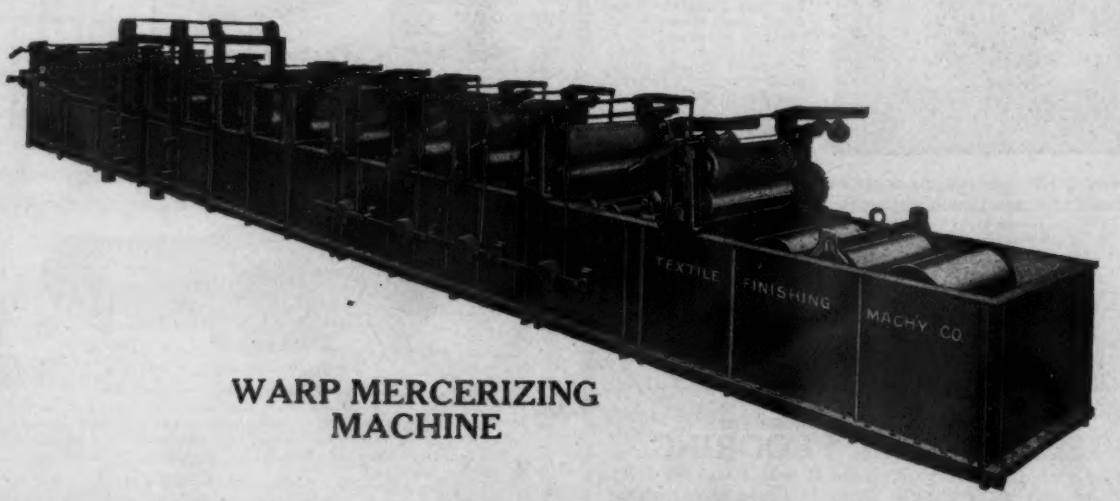

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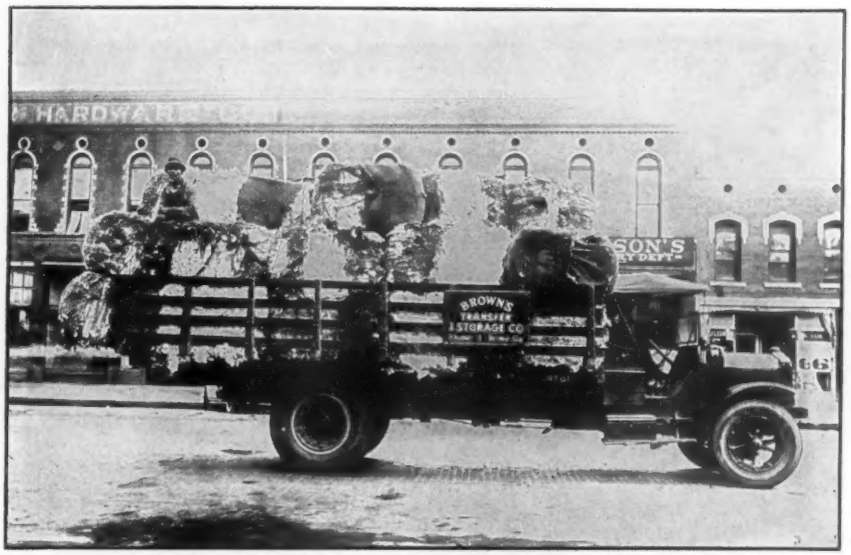

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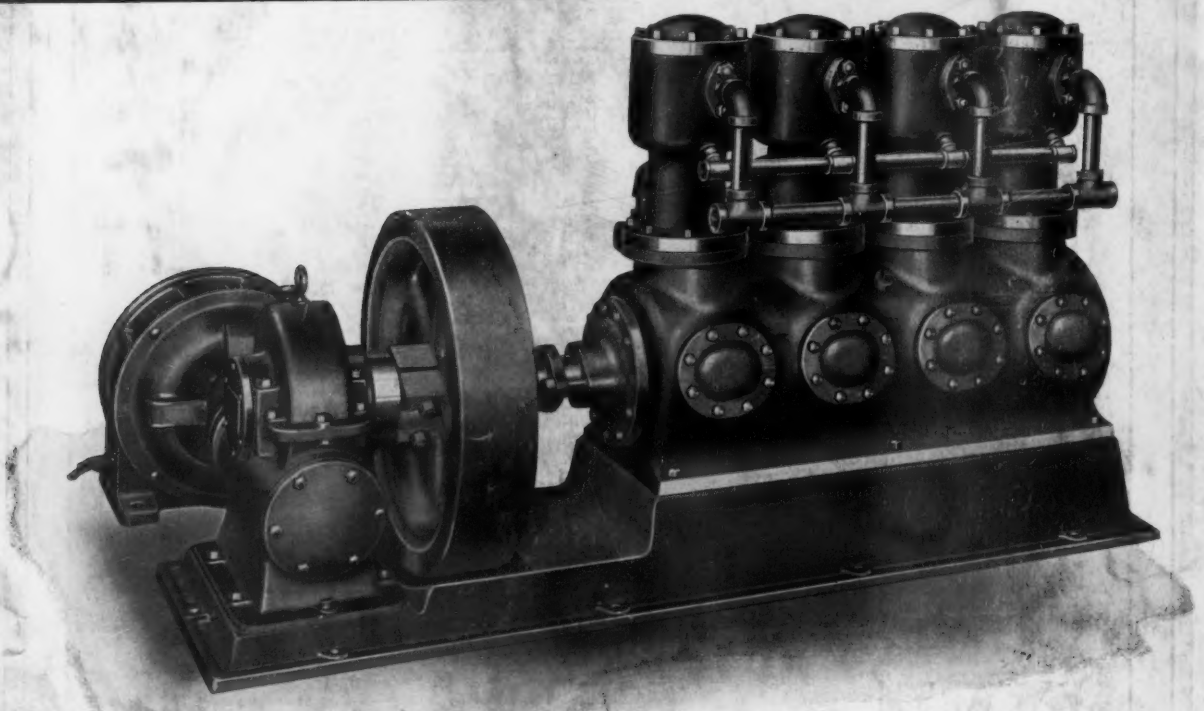

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